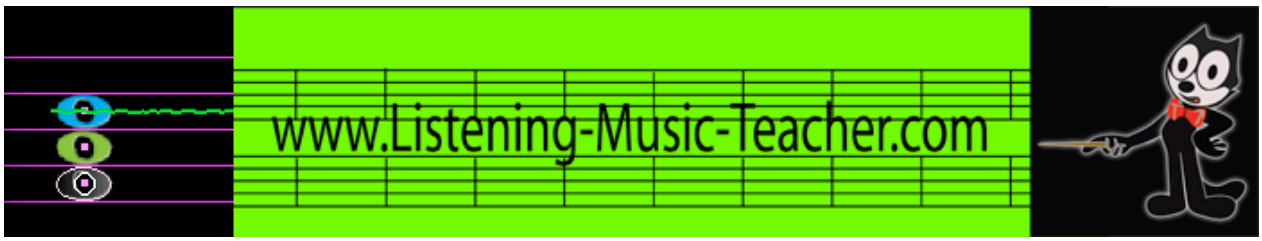

Listening Music Teacher

User's Manual

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Welcome to Listening Music Teacher (LMT)

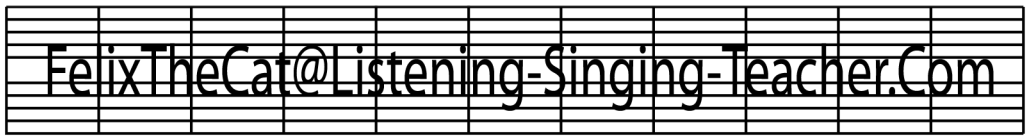
Listening Music Teacher is a software with a simple visual approach to understanding music. Mastering music starts in the head. There is no thing nearer to your brain than your ears and your mouth. The mouth and each ear are even interconnected by an internal tube: the trumpet. That is why Listening Music Teacher uses your voice as an instrument. The program listens to you, evaluates your achievements, and gives you visual feedback, on where you stand.

Listening Music Teacher allows you to proceed at your own pace. Listening Music Teacher is always ready for an exercise, never gets bored and gives non-judgmental feedback on what he has heard.

The program teaches the fundamentals of music theory. It shows the source of the eight note scale by means of a simple string. Strings swing with a fundamental frequency. Keeping the tension of a string the same and making it smaller changes the fundamental frequency. Halfling a string results in double the frequency. In musical terms we say that the new sound with half the string length is an octave higher than the sound of the original string. We get the next overtone by dividing the string in three parts. Taking two thirds as a string length we get the very important fifth in music.

After showing these basic relationships between music and physic, the program continues with listening training. Learn how to differentiate single notes, two notes (intervals), three notes (triads) and four notes (seventh chords). During the exercises you have to amplify a note from the chord in your head and then sing the note back. You will also learn to name the quality and the inversion of a chord.

We hope you will spend many enjoying hours with Listening Music Teacher. Your comments and inputs are most welcome: Please mail them to:



Installation Macintosh

Requirements

Before you begin, make sure that your computer is fast enough. To have a good performance a G4 with 1 GB of RAM and adequate graphic card is required. A Mac Mini G4 with 1.25 GHz and 1 GB of RAM should do it. The program was tested with Mac OS X l0.4.11.

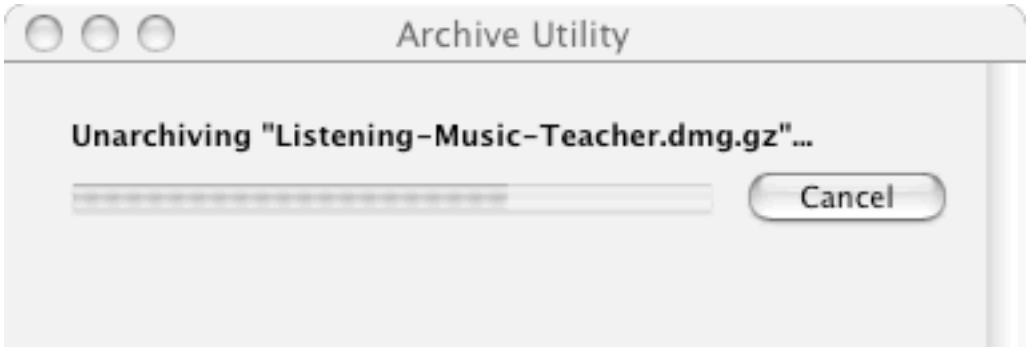
You also must have an appropriate microphone connected to your computer. Check the relevant manuals on how to connect a microphone to your computer. A Mac Mini G4 for example does not have a microphone input, you have to use additional hardware like a computer compatible USB device capable of handling microphone inputs. Important: A line in is not the same as a microphone input. If you do not have a microphone input you may need a pre-amplifier.

Getting and unpacking the disk image

The first step is to download the compressed disk-image-file. In your browser go to www.Listening-Singing-Teacher.com and download the actual version.

Warning: The file has a whopping 120 MB, this will take about 1/4 hours on a DSL line. After the download has completed you should see an icon that looks like this:

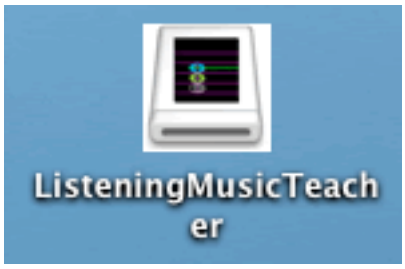
The second step is to decompress the file. Double-click on it: the archive Utility appears.



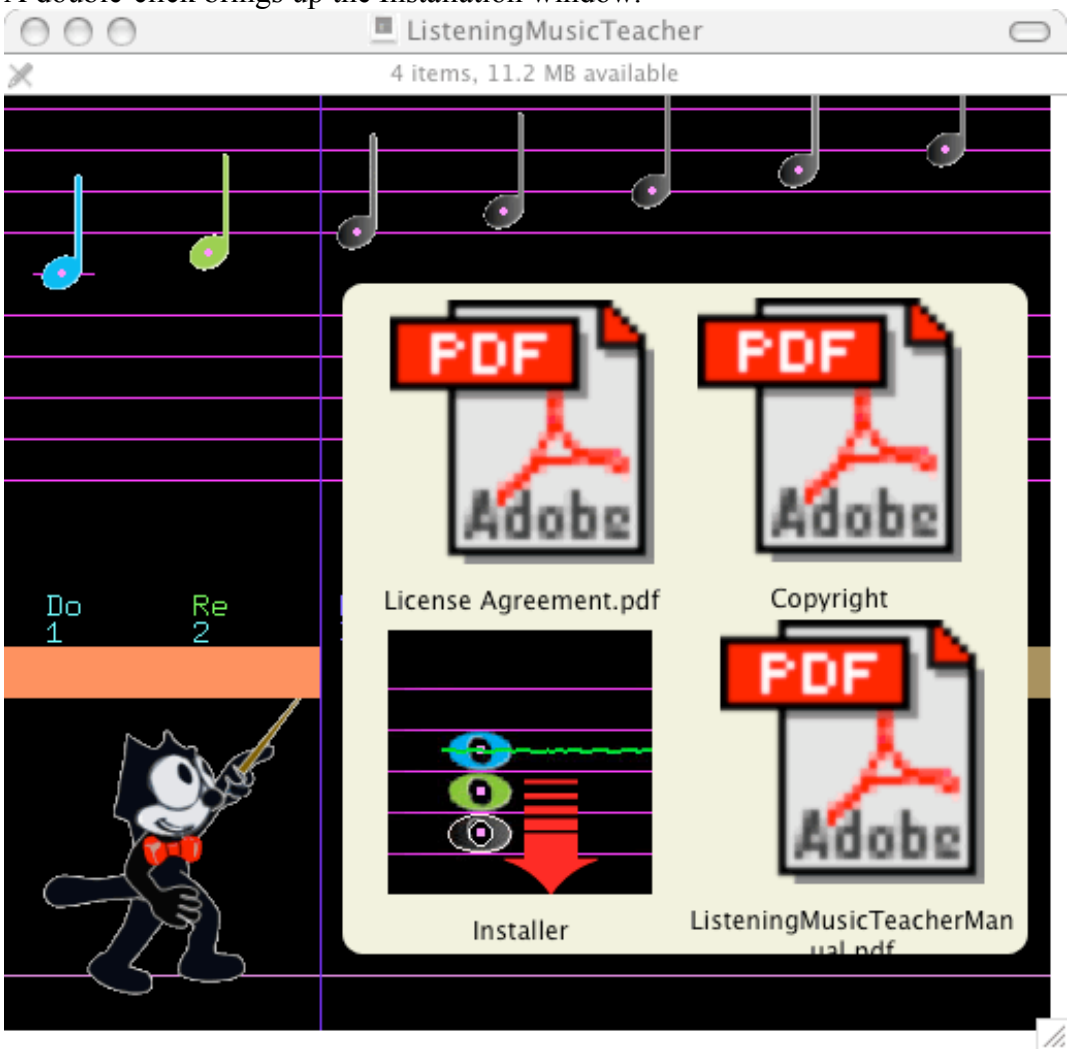
Be patient as this may take a while.

After this task finishes double-click on the new icon, which was created.

The Disk Image gets mounted. On the desktop you should see the following icon:



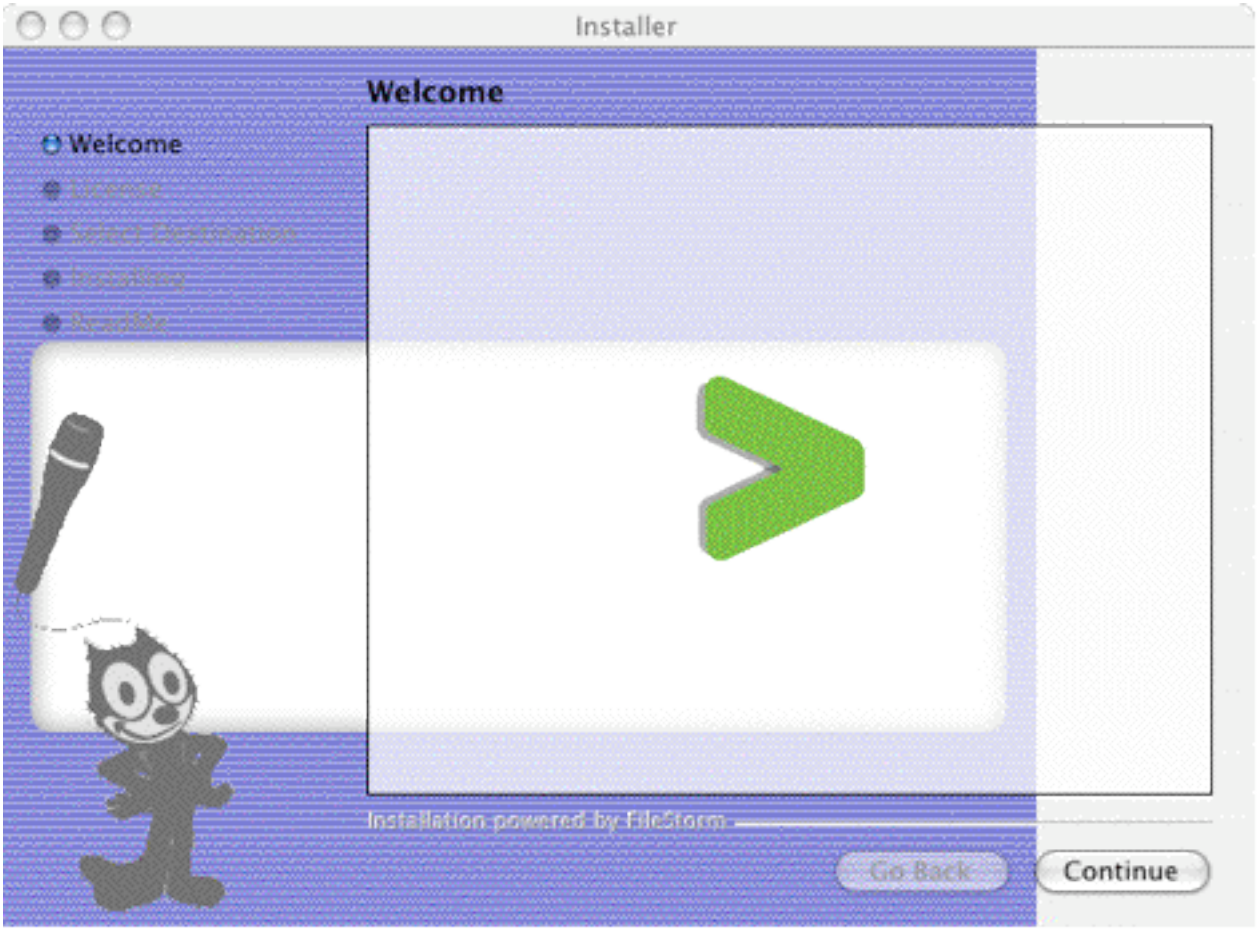
A double-click brings up the Installation window.



Installation

Reading the License Agreement and the Copyright, before installing is a good practice. During the installation you must agree to the terms anyway or discard the downloaded files.

By double-clicking the installer, the installation process starts. Before the Welcome screen appears a minute or so may elapse. The installer will guide you through the installation process.



If you used the defaults during the installation, Listening-Singing-Teacher should have been installed in your applications Folder.

Uninstalling Listening Singing Teacher
In the Finder click on Applications and drag the Icon for Listening Singing Teacher to the Trash.

Installation Windows

Requirements
Before you begin, make sure that your computer is fast enough. To have a good performance an Intel core Duo with 1 GB of RAM and adequate graphic card is required. The program was tested on Windows XP, Vista and Windows 7.

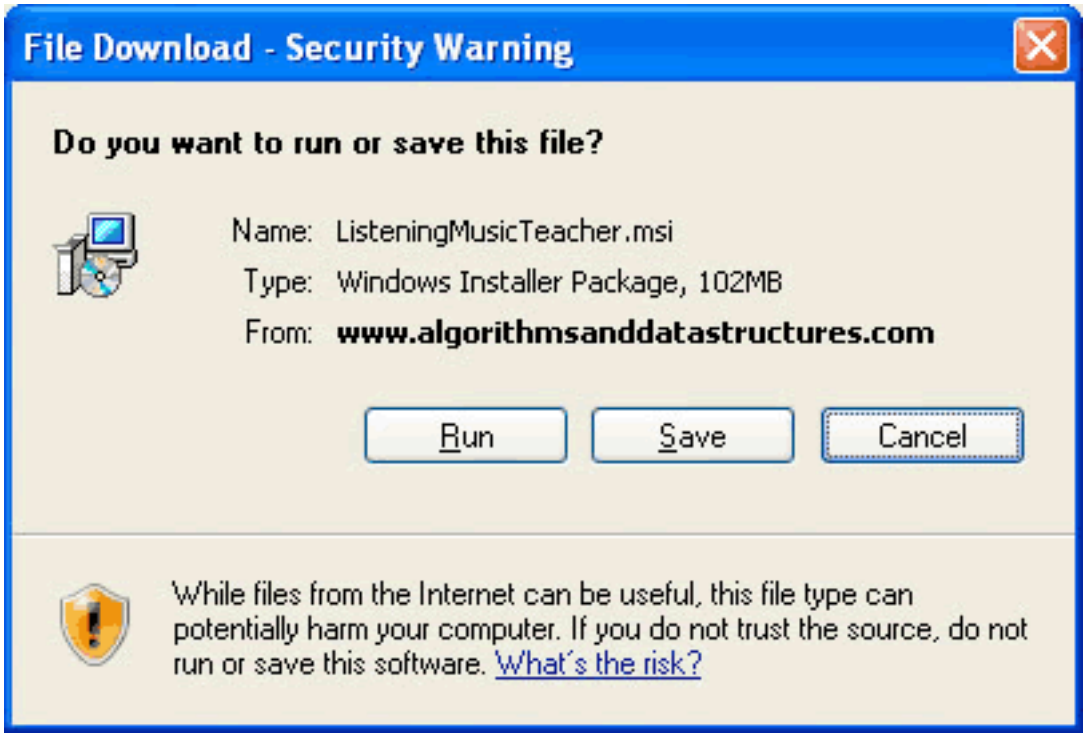
You also need QuickTime.

You also must have an appropriate microphone connected to your computer. Check the relevant manuals on how to connect a microphone to your computer. Some PC's do not have a microphone input; in this case you have to use additional hardware like a computer compatible USB device capable of handling microphone inputs. Important: A line in is not the same as a microphone input. If you do not have a microphone input you need a pre-amplifier.

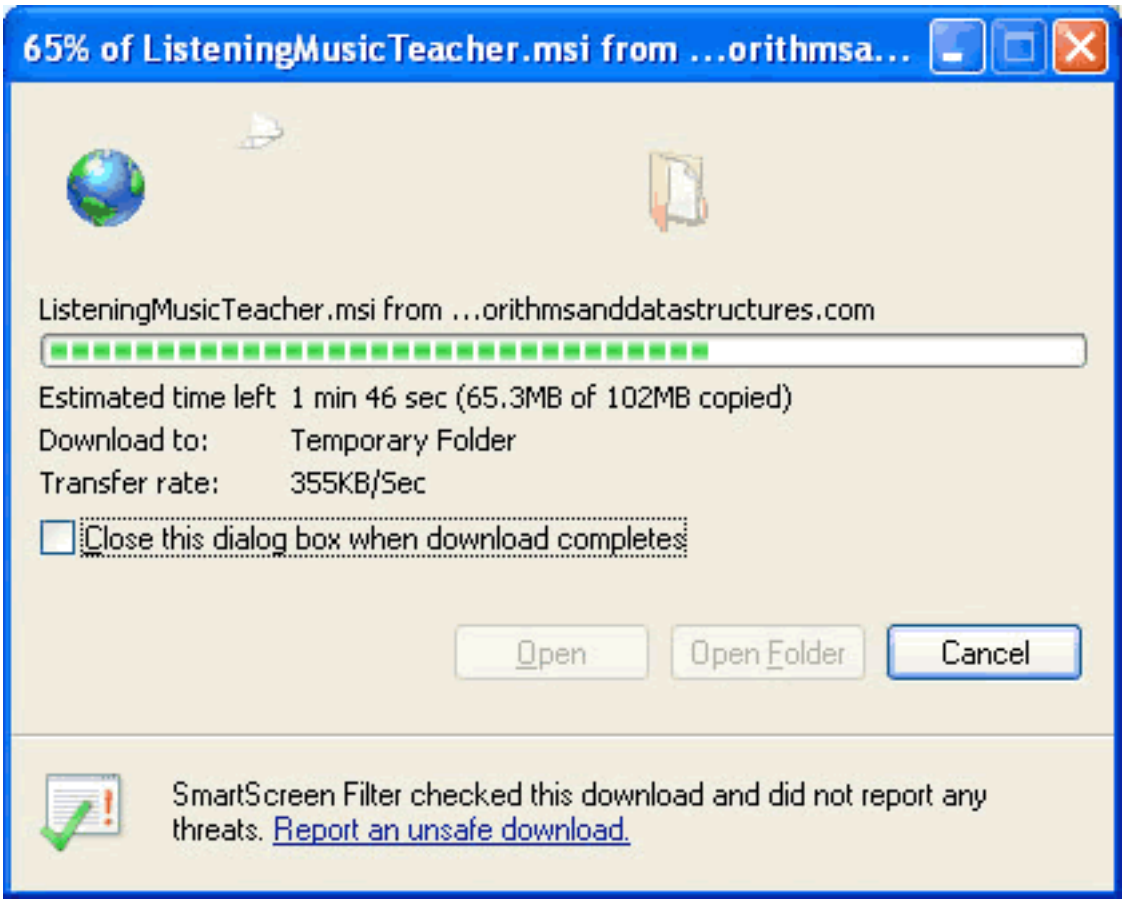
Getting the installation file
The first step is to download the compressed installation file (.msi). In your browser go to www.Listening-Music-Teacher.com and download the actual version under the download-tab.

Warning: The file has a whopping 120 MB; this will take about 1/4 hour on a DSL line.

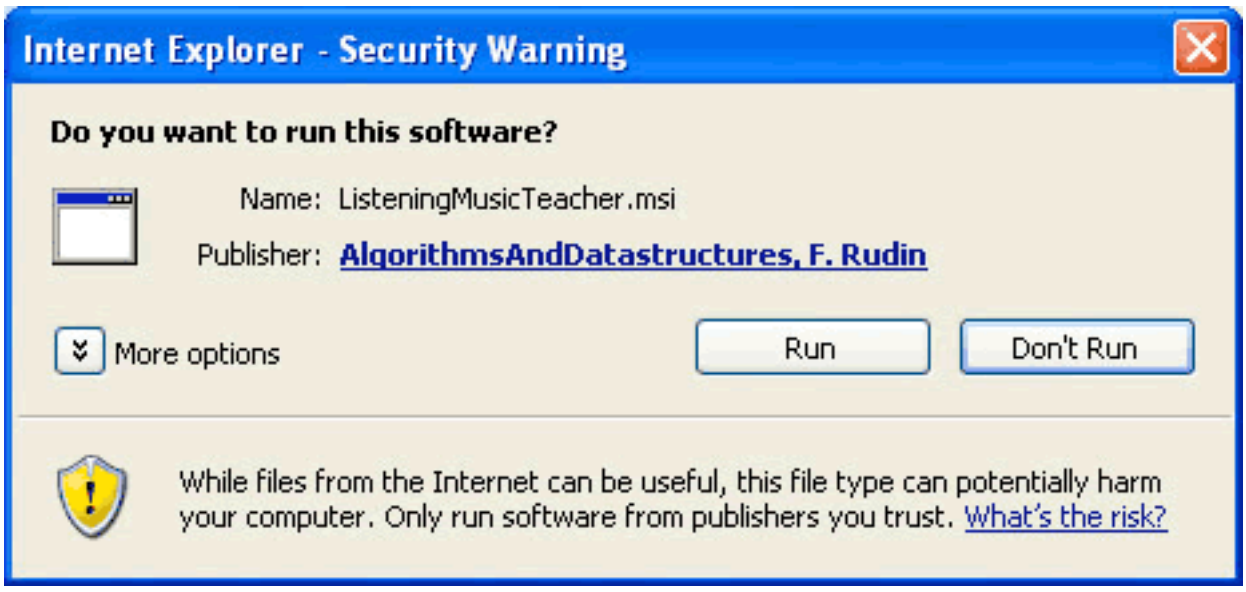
Installation
After clicking the download link the following window opens:



Click "Run". The actual download starts.

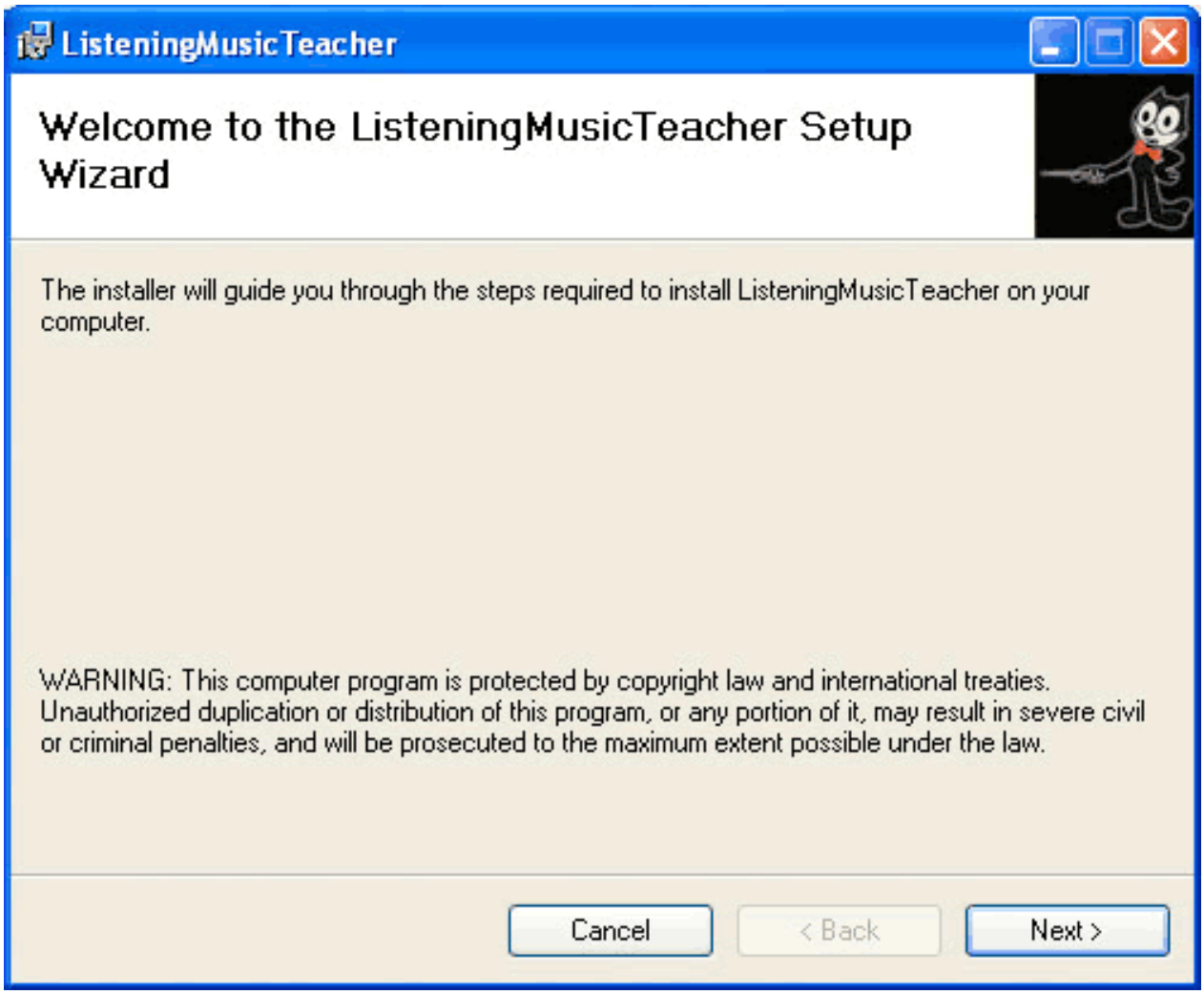


When the download finishes the following Security Warning appears:

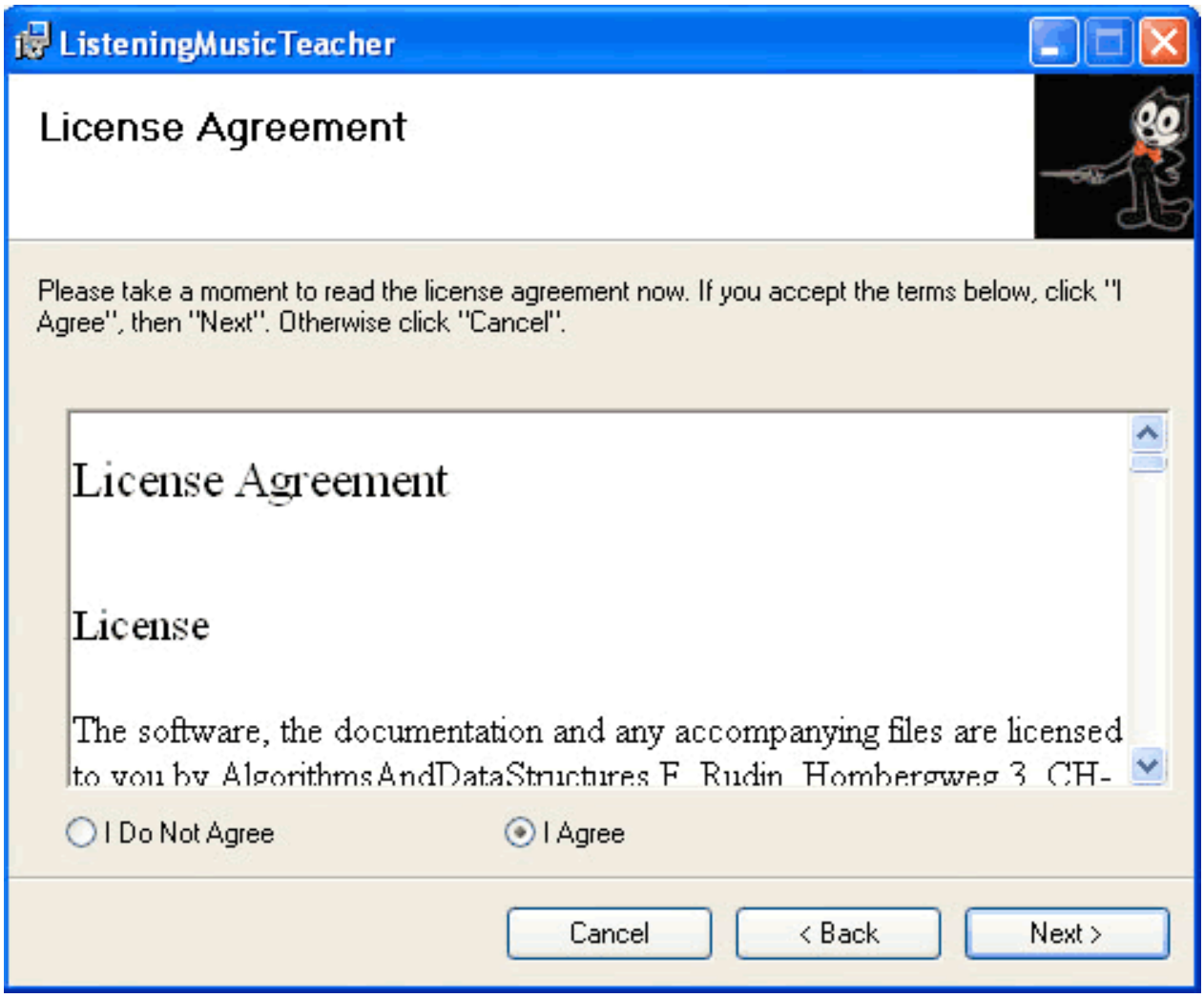


If you do not trust us click “Don’t Run” otherwise click “Run” to continue the installation.

The Setup Wizard Window opens:

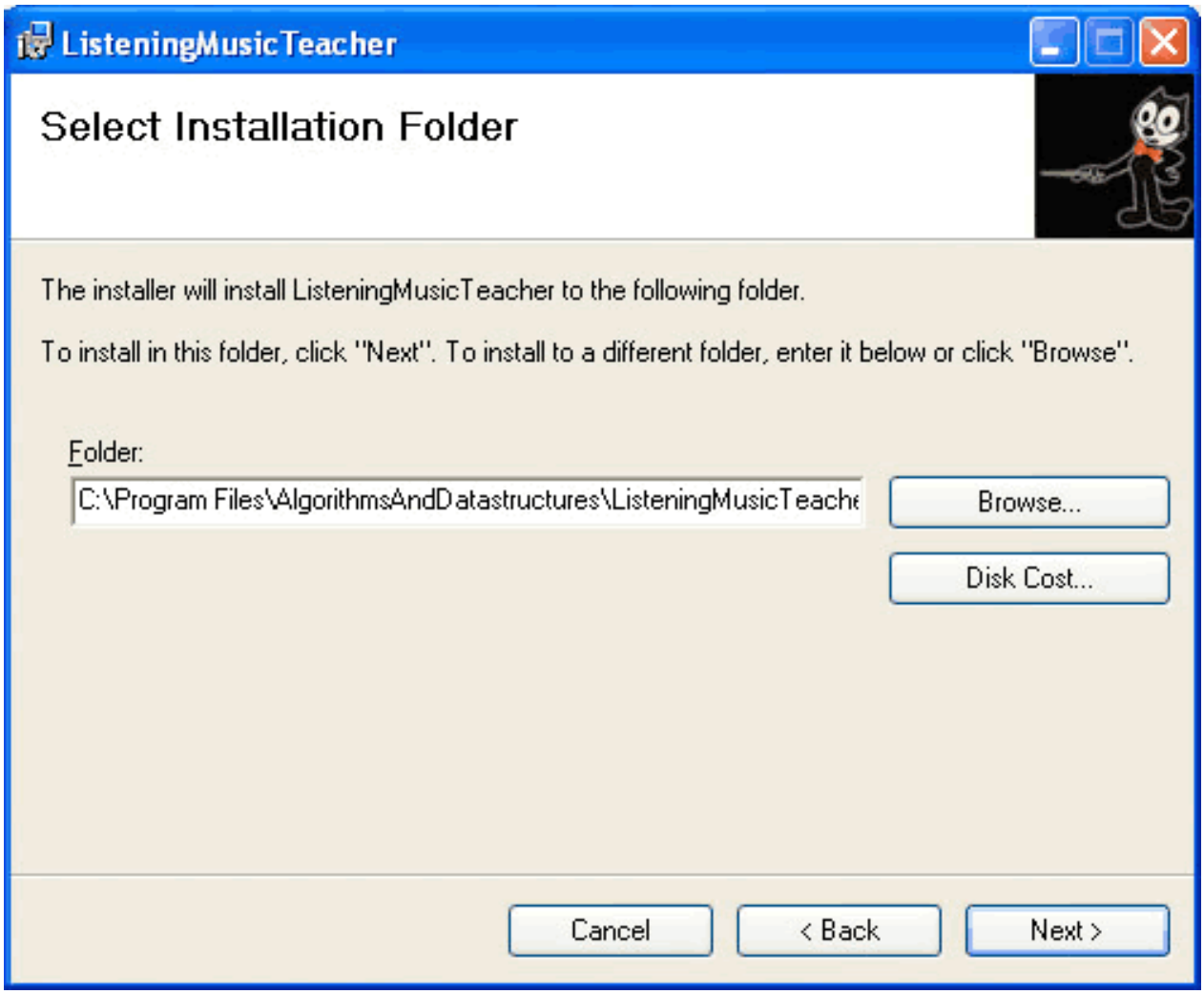


Click Next. The License Agreement appears.



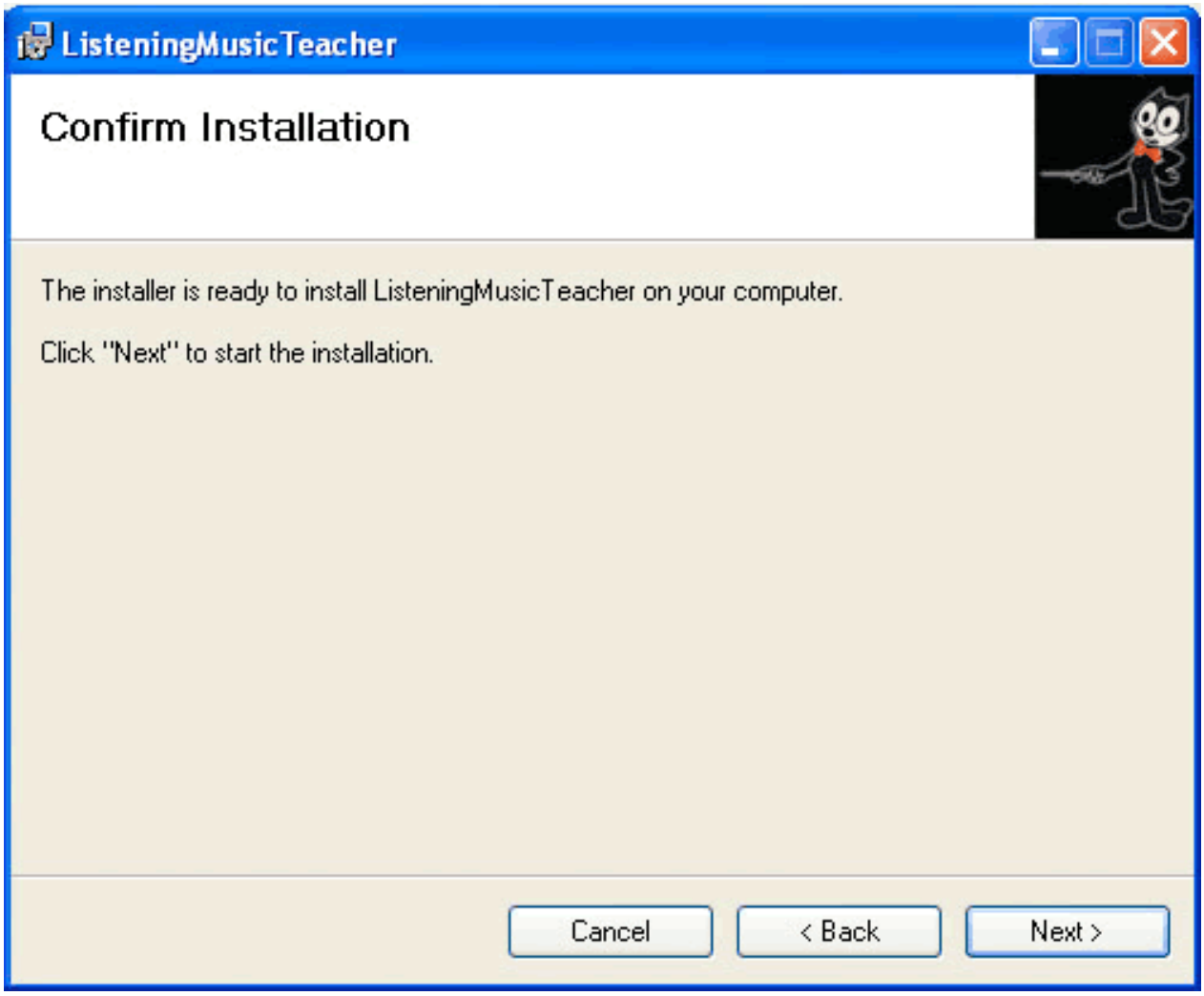
Reading the License Agreement and the Copyright, before installing is a good practice. Click “I agree” if you agree with our License Agreement.

The “Select Installation Folder” dialog appears. By default the application will be installed under C:\Program Files\AlgorithmsAndDatastructures\ListeningMusicTeacher.

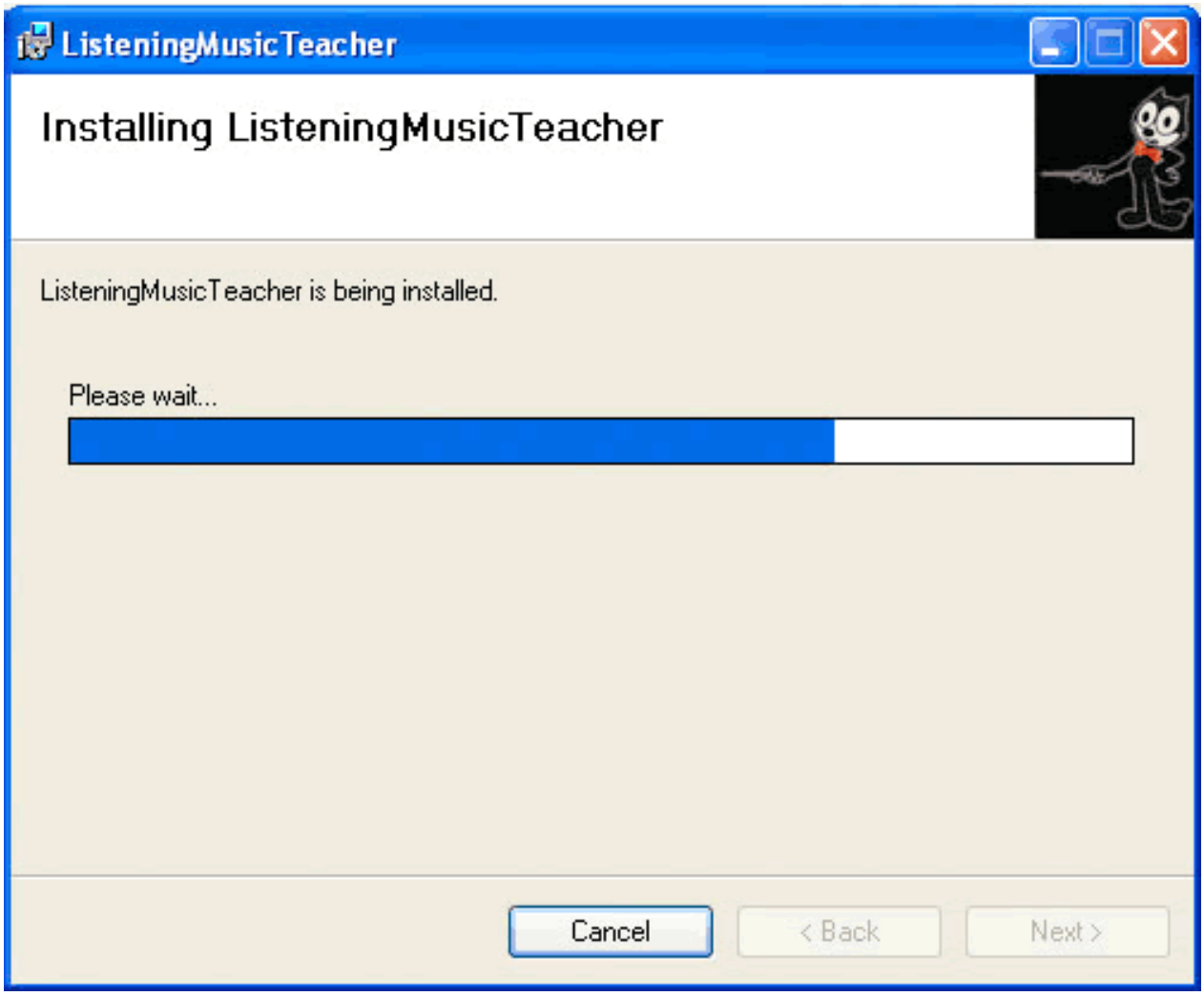


Choose your folder location and click “Everyone”, so that persons with a separate login on your computer also can run the game.

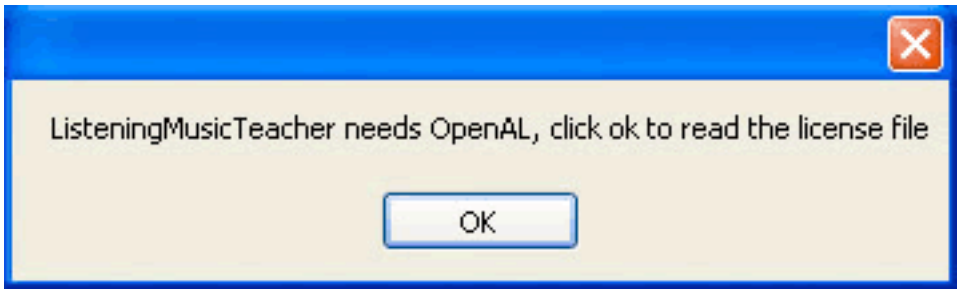
The confirmation Window appears:



Click “Next” to start the actual Installation:



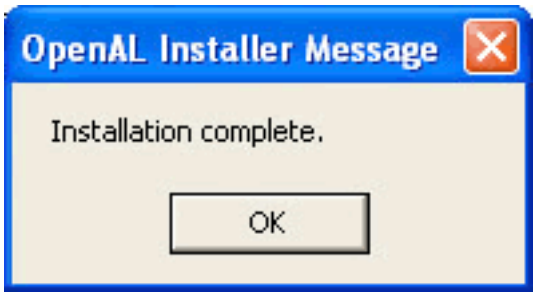
Listening Music Teacher uses OpenAL for sound.



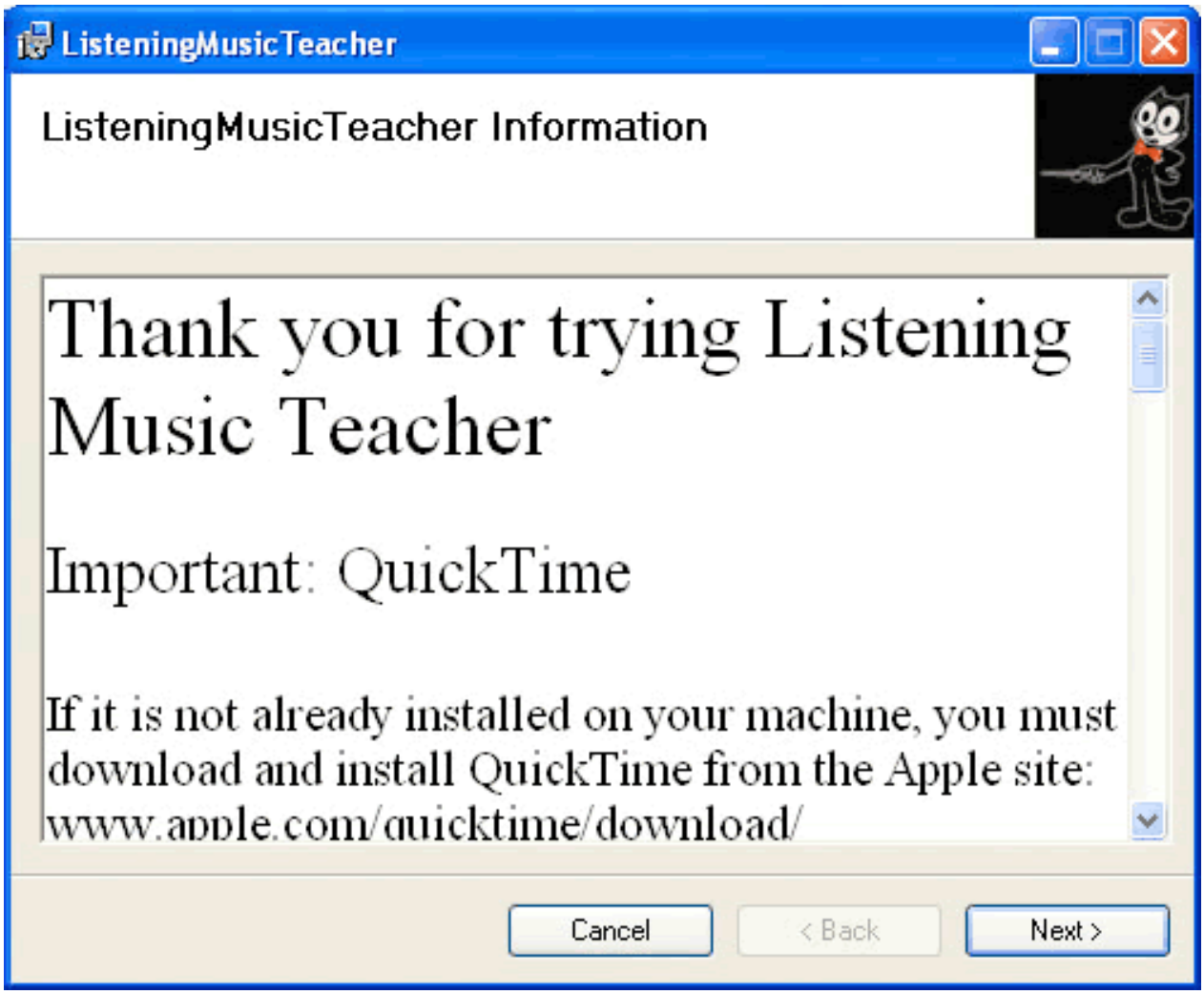
Click “Ok” and you will be presented with the OpenAL License Agreement:

Click “OK”, if you not already have installed OpenAL.

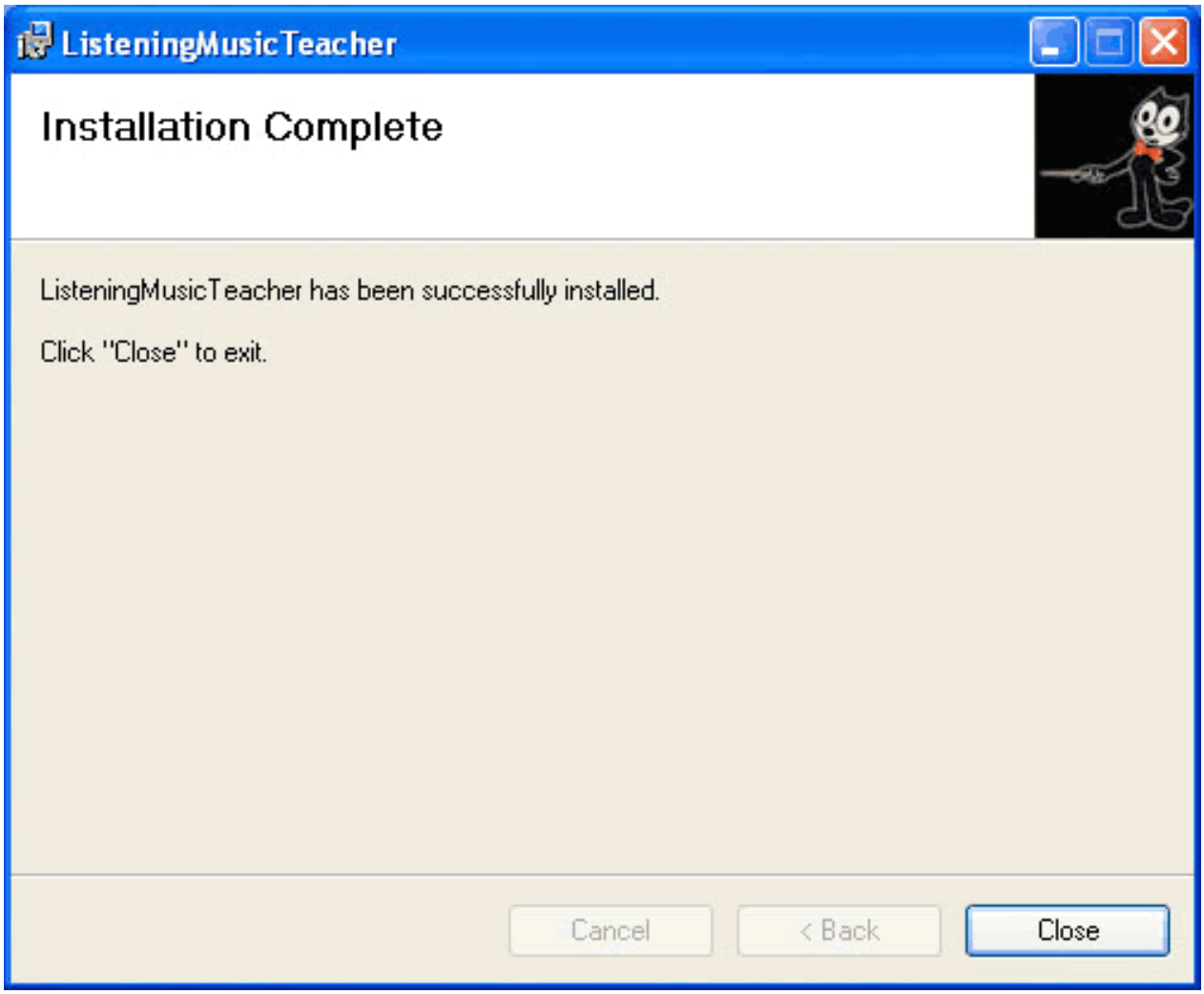
The OpenAL Installer informs you about the installation:



Finally, the installation is finished.

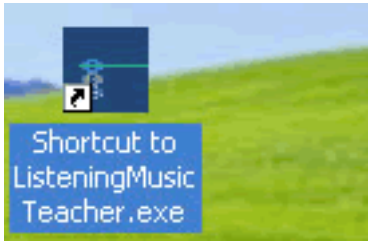


Browse through the ReadMe file, and then click “Next”.



Click “Close”.

On the Desktop you should find a Shortcut to ListeningMusicTeacher:



Uninstalling Listening Music Teacher

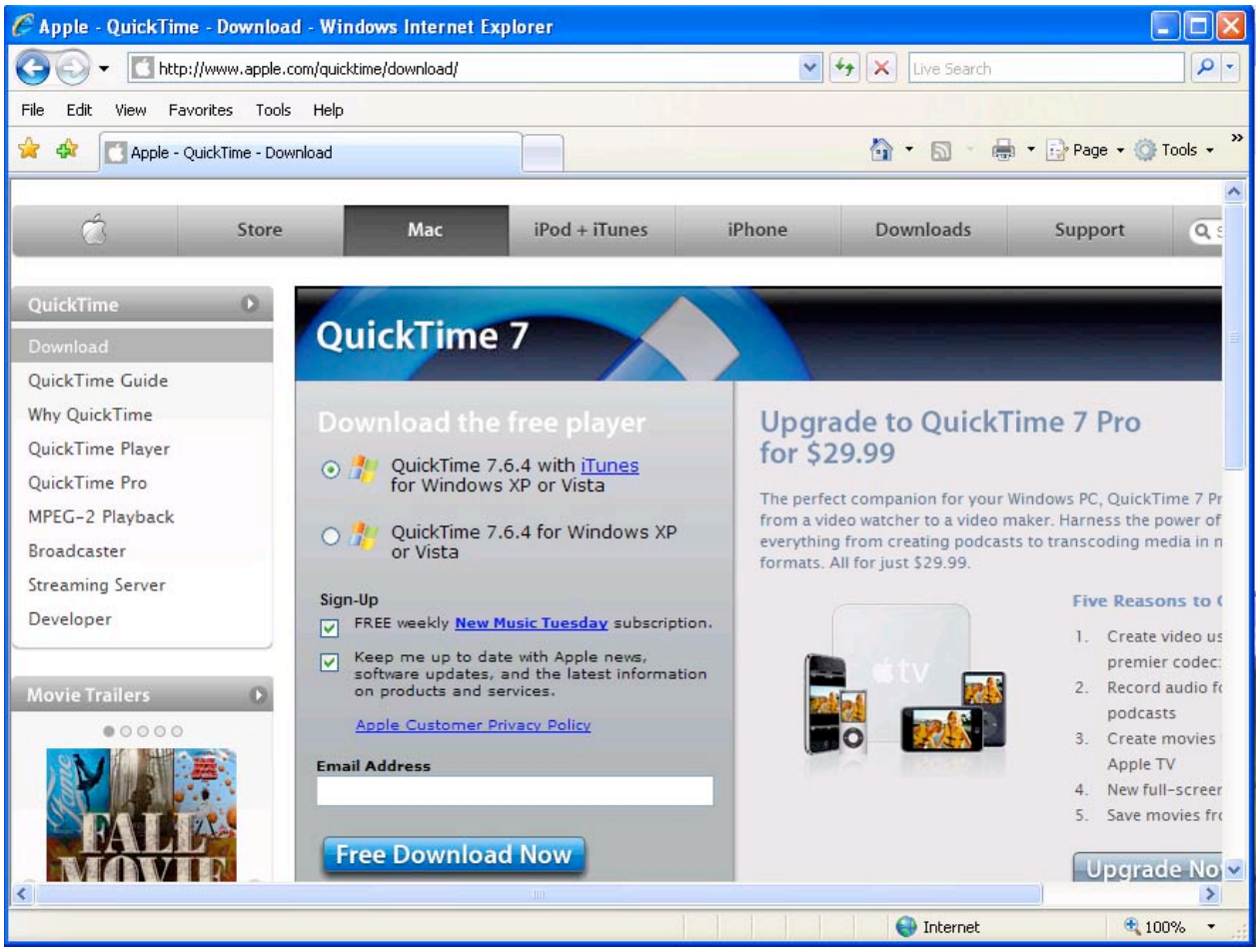
Use Uninstall from the Add/Remove Software Control Panel.

QuickTime

This software uses QuickTime from Apple Computer, Inc. On Macintosh computers this software is pre-installed. On Windows computers QuickTime is not installed by default. If you have installed QuickTime or iTunes for some other reasons, you do not have to install QuickTime again. However it is a good practice to have the newest release.

You need Windows XP with Service Pack 2 or Windows Vista to be able to install QuickTime.

In the Internet Browser enter http://www.apple.com/quicktime/download. You should be presented with a page like this:



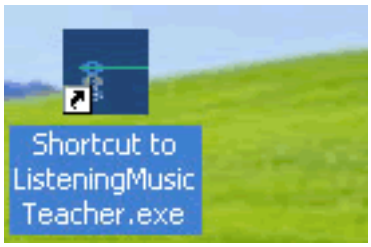
Choose if you want to install QuickTime with iTunes or only QuickTime. Click “Free Download Now” and follow the installation instructions.

After installing QuickTime, you should be ready to use Listening Music Teacher.

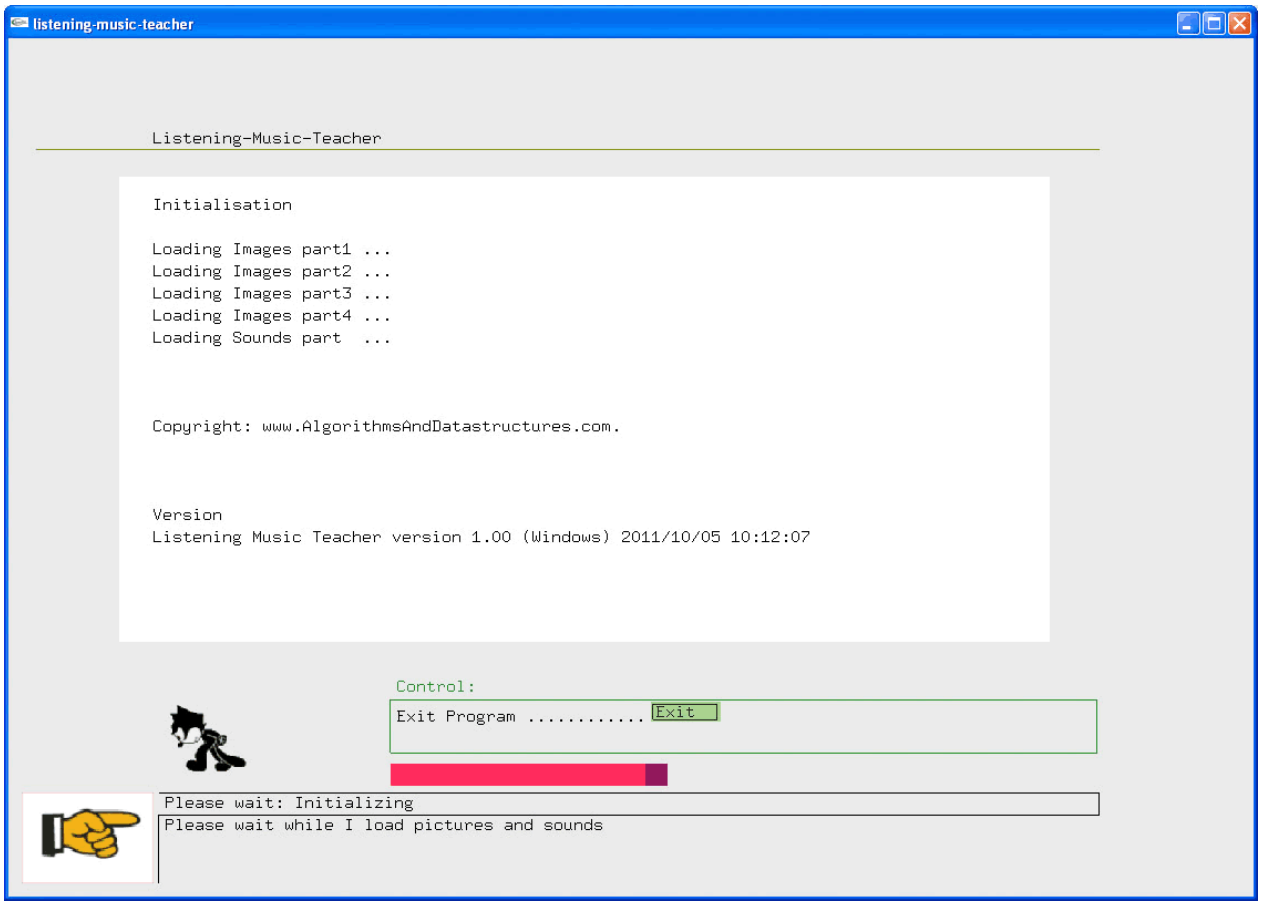
First Time Use

Macintosh: Double-click the application ListeningMusicTeacher in the applications folder:

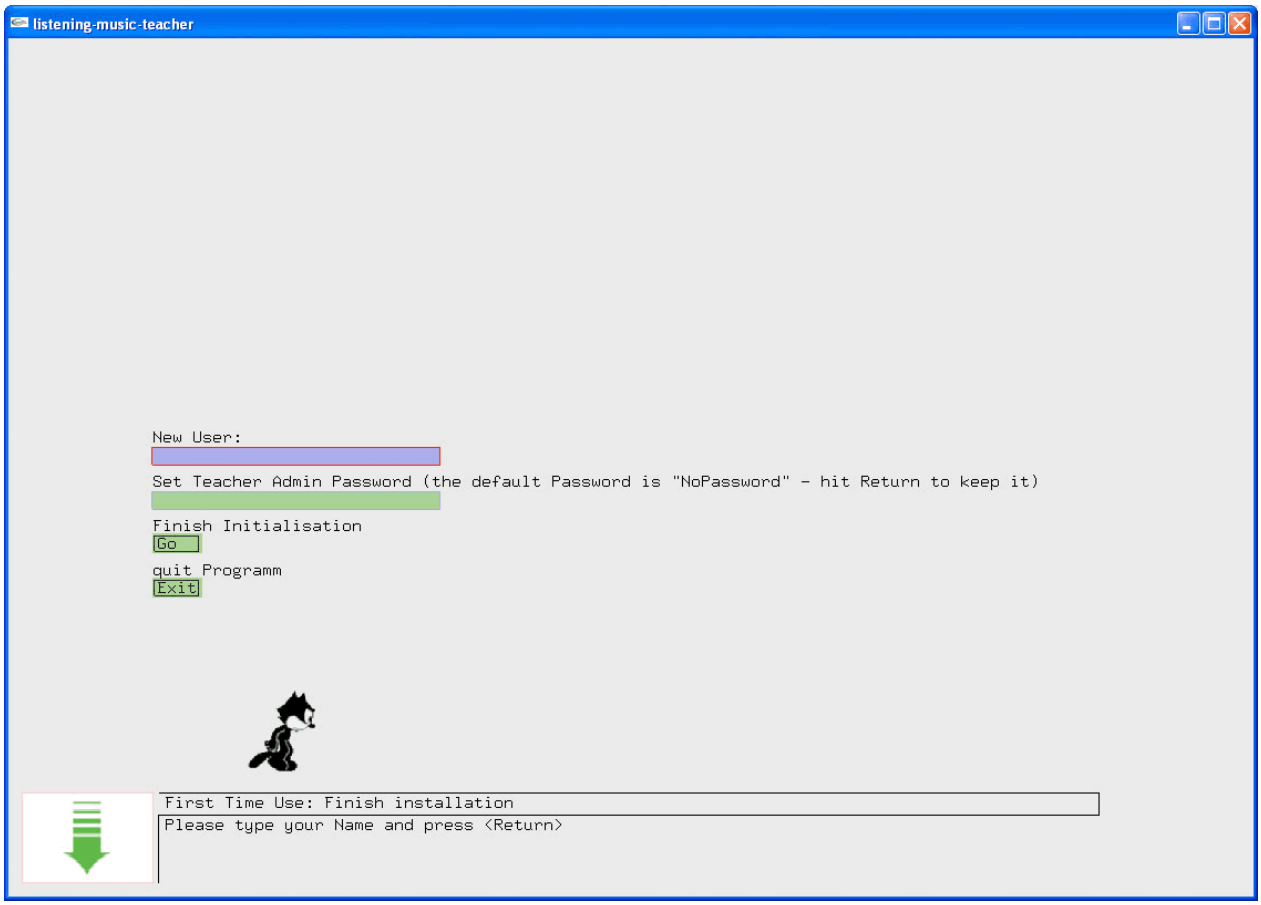
Windows: Double-click the shortcut on your Desktop:



The application starts initializing by loading images and sounds.



The first time you start the application the following dialog appears:



First you must enter a User Name. The name may consist of a First and Last Name, separated by a blank or a comma. Only the American Standard Characters are allowed.

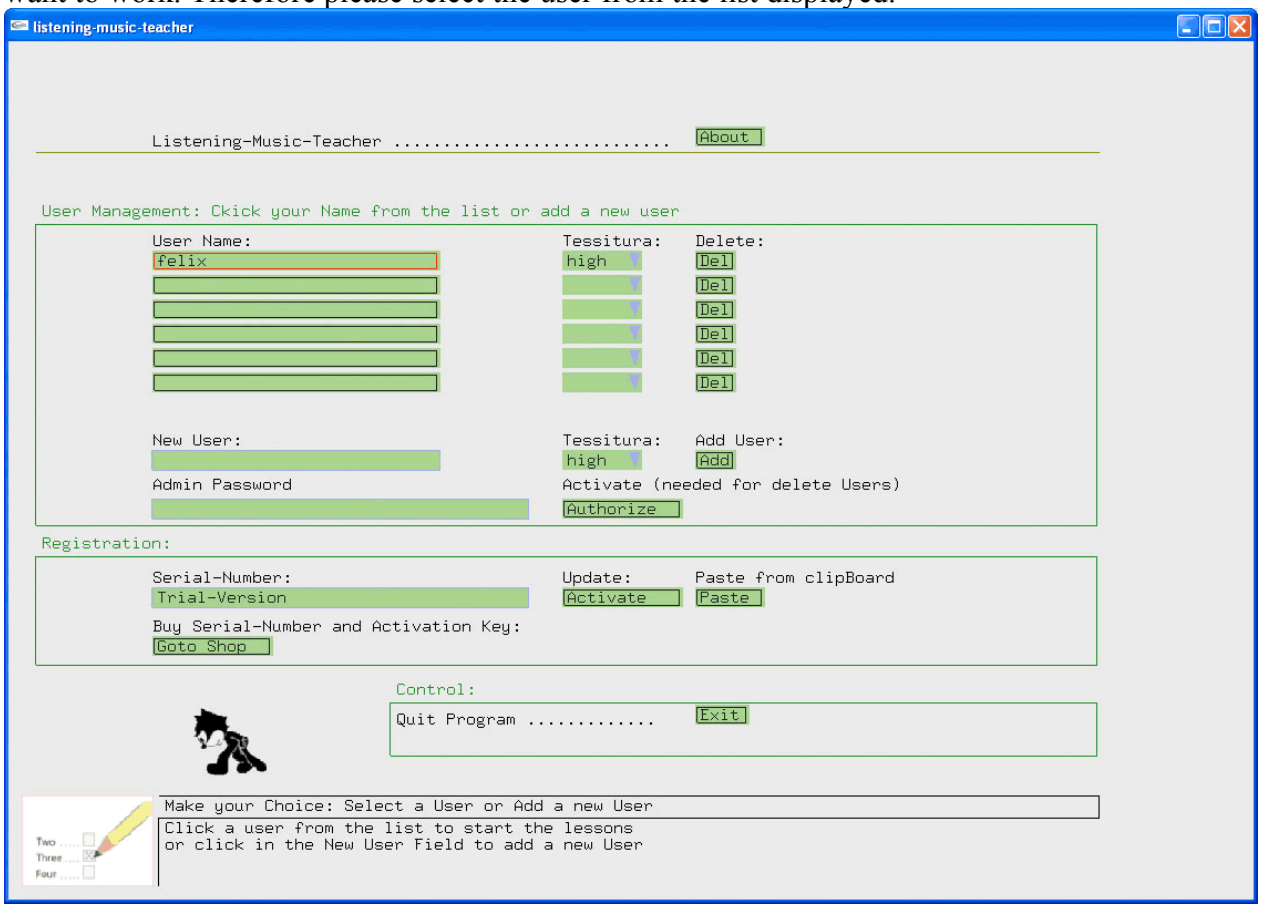
If you do not like the default Admin Password “NoPassword” change it. Please be aware that the password is case sensitive. The password must have at least 5 characters. If you forget or loose your password you must reinstall the application, in order to be able to delete users.

If you are done click “Go” to continue.

Clicking “Exit” will leave the program in its current state and ask you again for the name when started.

Select User

In order to collect statistics for a particular user, the program must know with which user you want to work. Therefore please select the user from the list displayed.



If you are not on the list you may add your name to the list by clicking in the New User field and typing your name. Select a tessitura, see next paragraph, and click “Add”. Your name should now appear and you can select it.

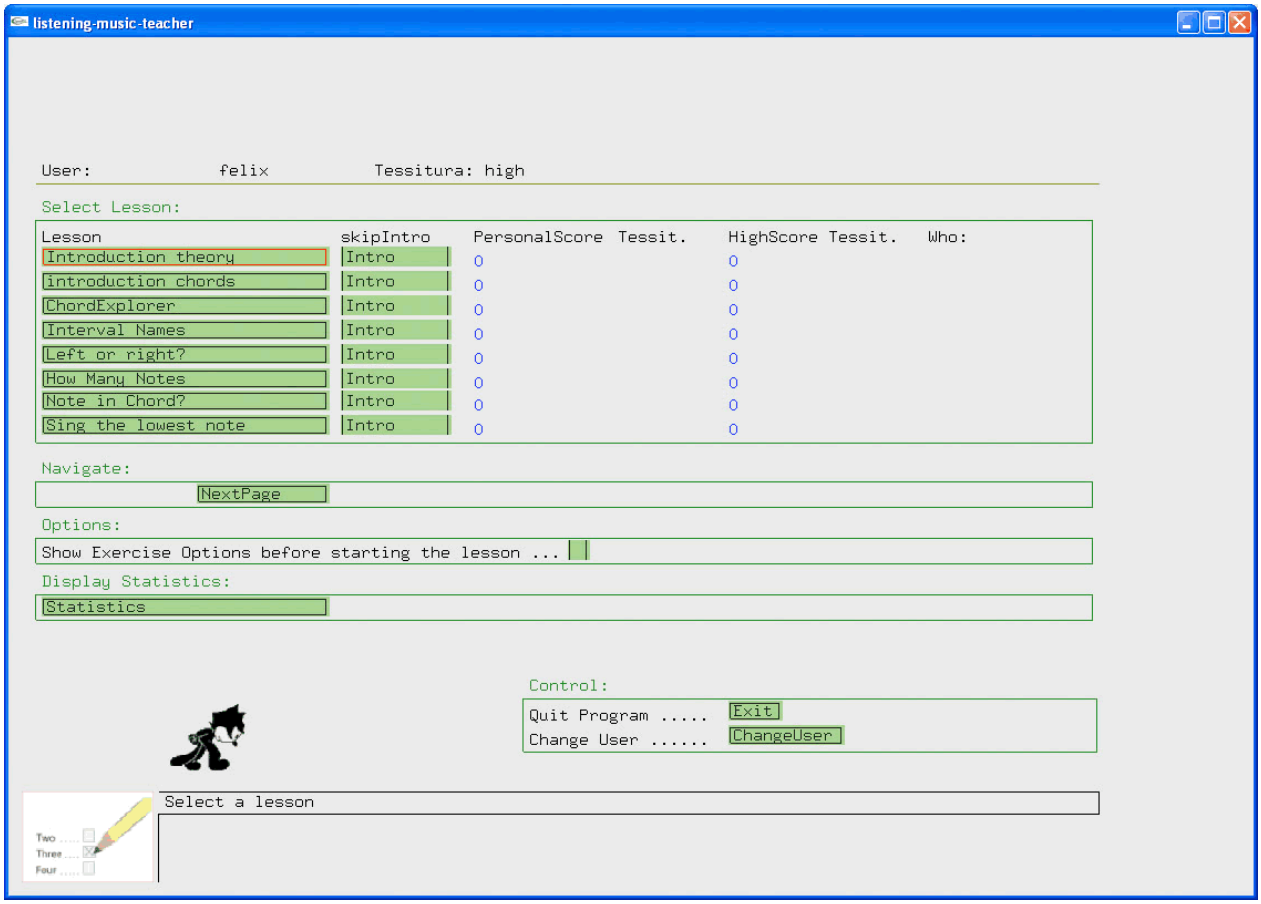
To adjust the exercises to the users pitch, the user must select a pitch range, a so-called tessitura. High means soprano, medium means baritone and low means bass. You can change the tessitura anytime, by going back to this dialog. It has no effect on the recognition; it only displays the notes in a range, which is hopefully suitable for your voice. If your voice spawns a big range (3 Octaves or more) you may go through the exercises in all tessitura modes.

If you want to delete a user, you must enter the Admin Password and click “Authorize”. Then click the “Del” Button next to the particular user you want to delete.

The registration process is explained in the last chapter.
For now, just select your desired tessitura and then click your name.

Select Lesson/Exercise

After selecting your name, the Select Lesson dialog will be presented:



In the Select Lesson frame you select the desired lesson/exercise. To the right of the lesson/exercise buttons you find another button, which allows you to skip the explanations given for a particular lesson/exercise. Clicking a button in the column SkipIntro will change the button to read, “Skip”, or if it is already on “Skip” it will be reset to “Intro”.

Next to the “SkipIntro” buttons you see your personal high score and tessitura in which you reached that score for this lesson. The scores are colored as follows:

- blue: You reached less than one third of the possible points
- green: You reached the basic level
- yellow: You reached more then two thirds of the possible points
- red: You have more then 90 % correct answers

As an additional encouragement, the highest score of competing players is included to the right.

In the navigation frame you find the “PreviousPage” and “NextPage” buttons, which allow you to page through the lessons/exercises.

Clicking on the “Statistics” button will bring you to the Statistics Section, which is explained in a following chapter Statistics.

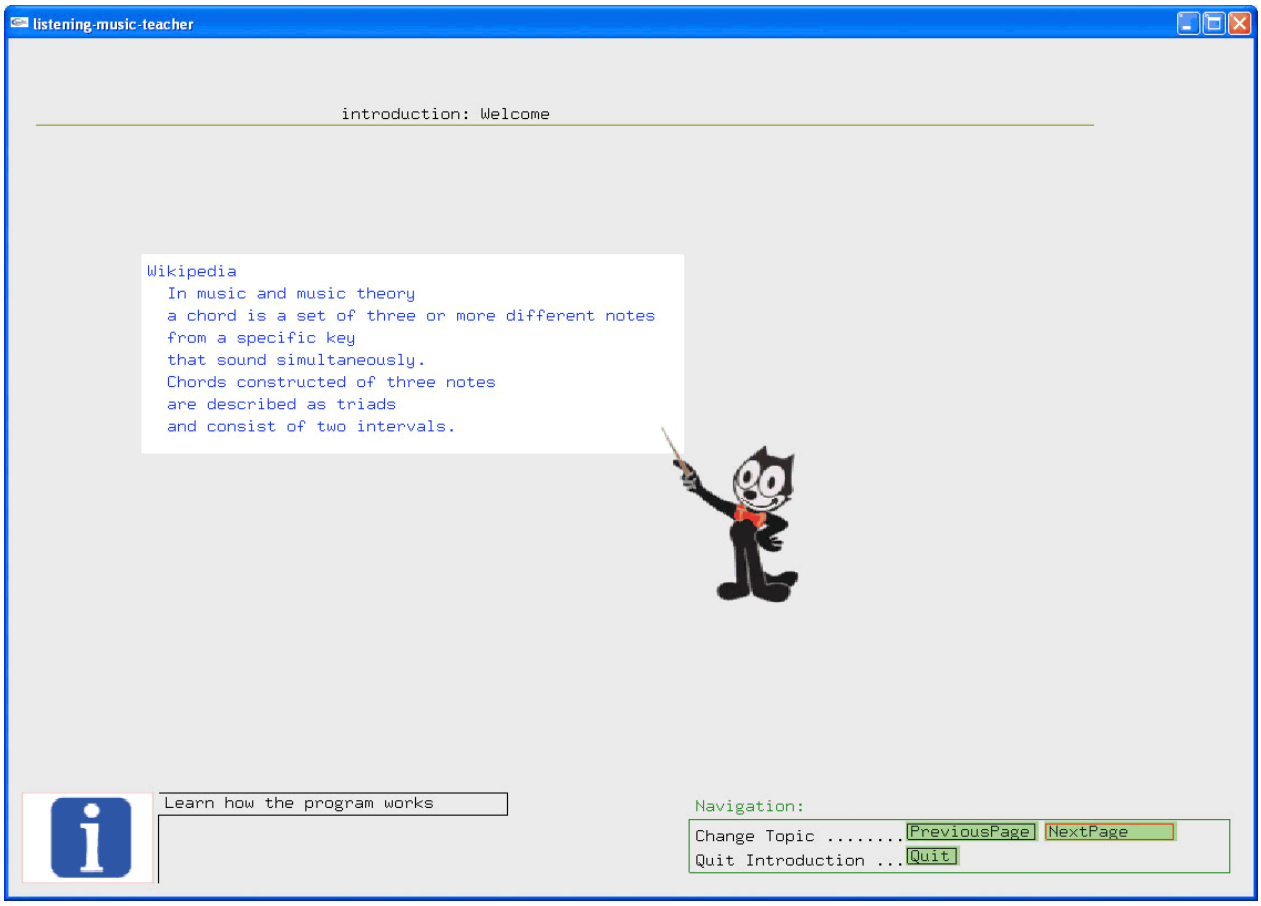
The first three lessons entitled ”Introduction Theory”, “Introduction Chords” and “Chord Explorer” are different from the others. The next chapters will go through these lessons.

All other lesson are exercises in which you can earn points. They are presented after the introductory lessons.

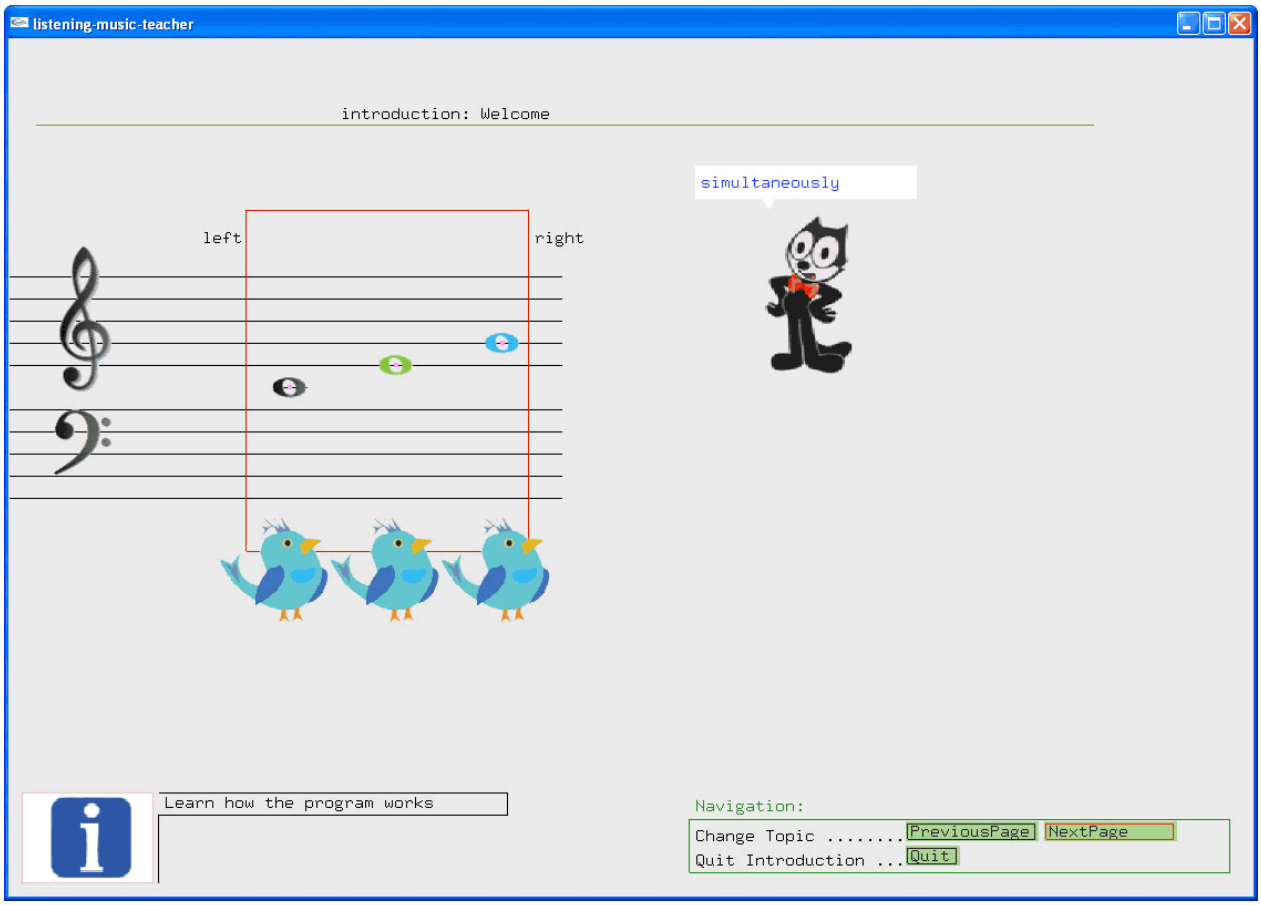
Introductory Lessons

Introduction Theory

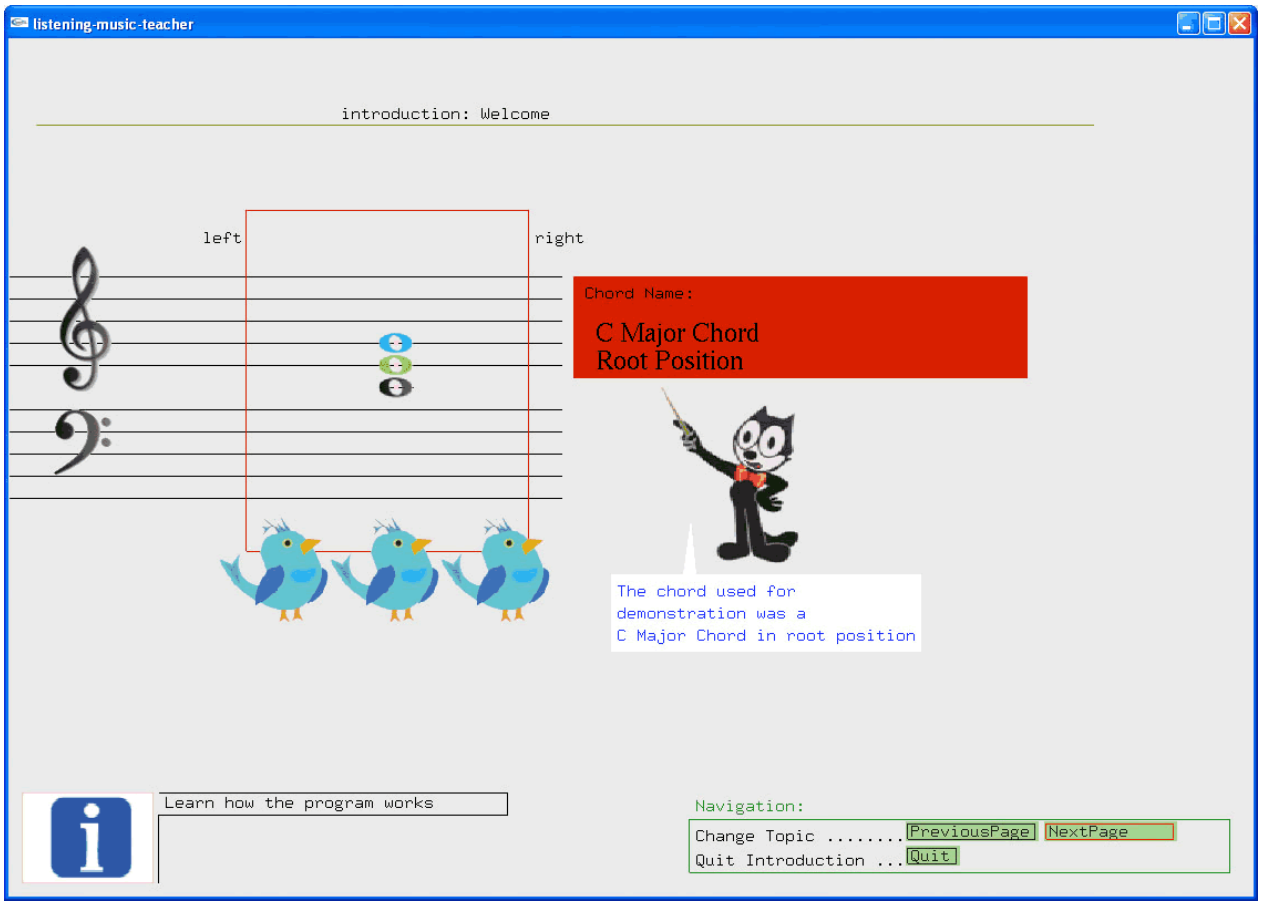
The introductory lessons are the only animated ones and explain you how the program works. This lesson gives a short overview what chords are and the relationship between the western music system and the laws of physics. First it presents the definition of chords, as explained by wikipedia.



According to this definition three birds could sing a chord, if they sing the notes simultaneously.



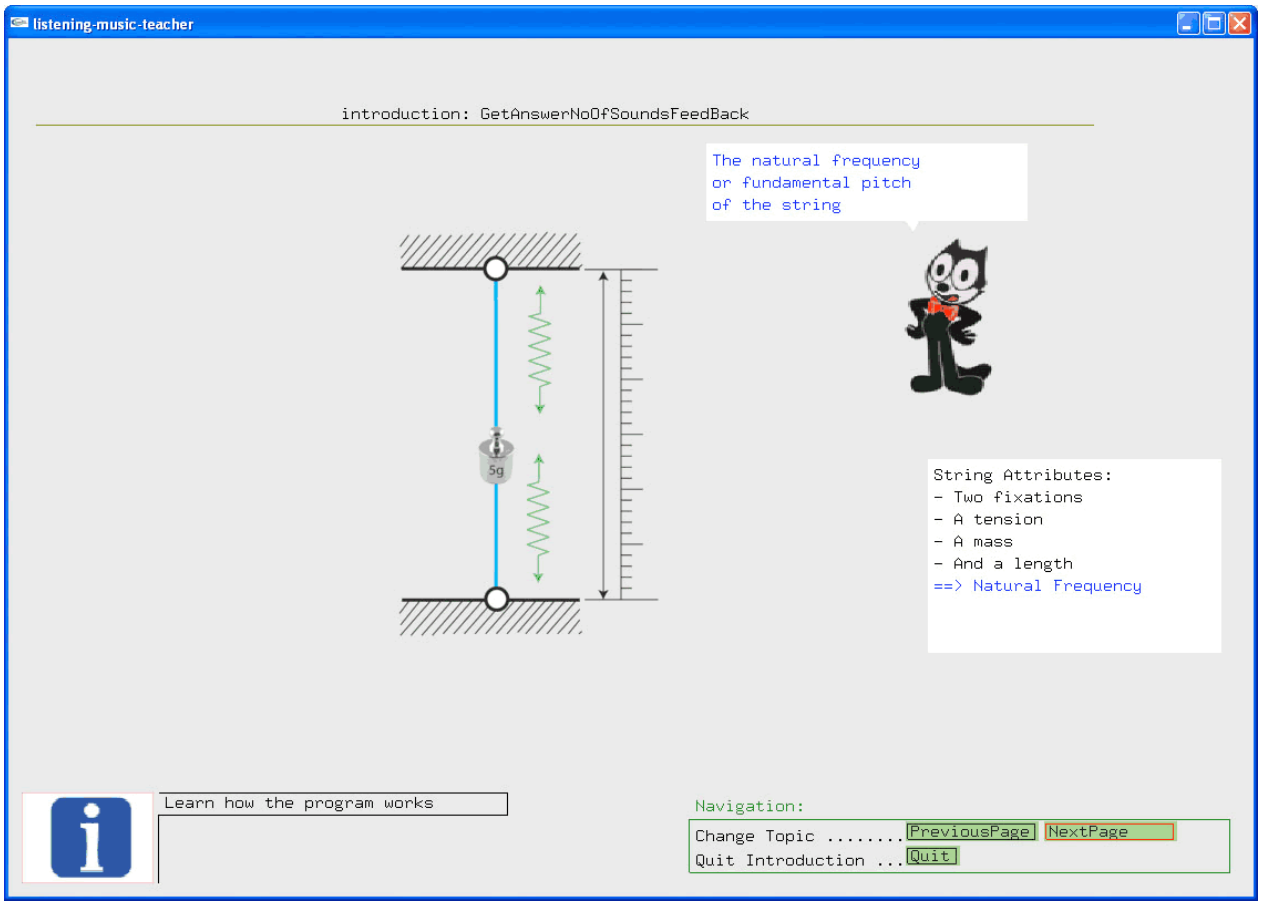
As an example a C Major chord is used.



However, not all combinations of sounds have a name. The most common chords are so called tertian chords. That is, they consist of notes that are thirds apart.

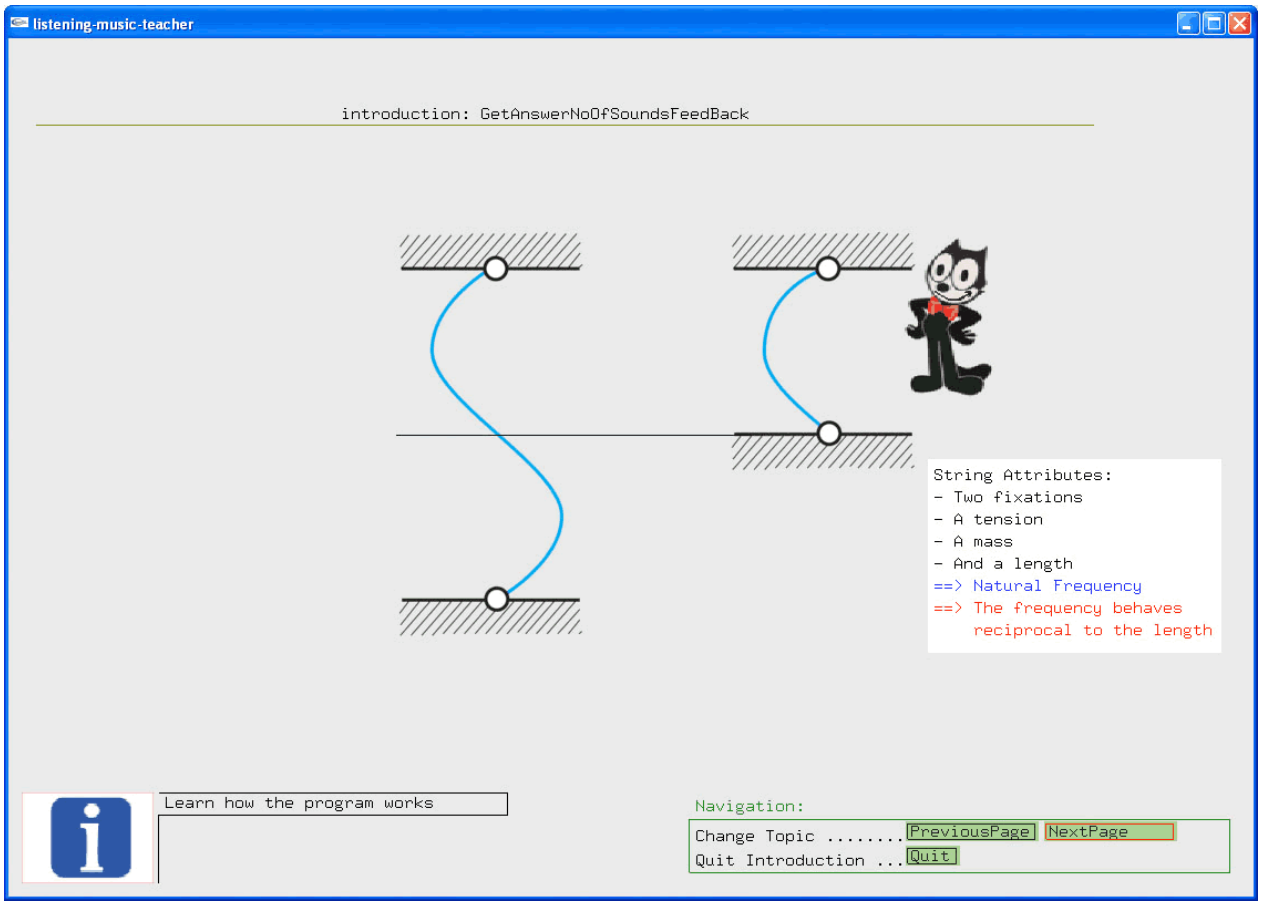
Why are tertian chords the most used chords? Simply, because they sound good. The reason for this is, that in nature all sounds have overtones. These overtones follow physical laws. And the strongest overtone, beside the octave, is the fifth. A fifth is a combination of a Major third and a minor third. Since we all live within nature, the concept of overtones, especially the strong fifth, is familiar. And things we know, we find pleasant. Psychological studies have shown, that human beings tend to return to things they know. The reward system tells them: You know this environment; therefore you are in control of the situation. In this way, let us explore the natural overtones.

With the help of a simple string, the relationship between physical laws and the musical concepts are demonstrated. Strings are used in many instruments, like the piano, the guitar, the harp or the violin. Strings have physical attributes like tension and length. The most important attribute is the length. If all other attributes stay the same, then the length determines the swinging frequency.



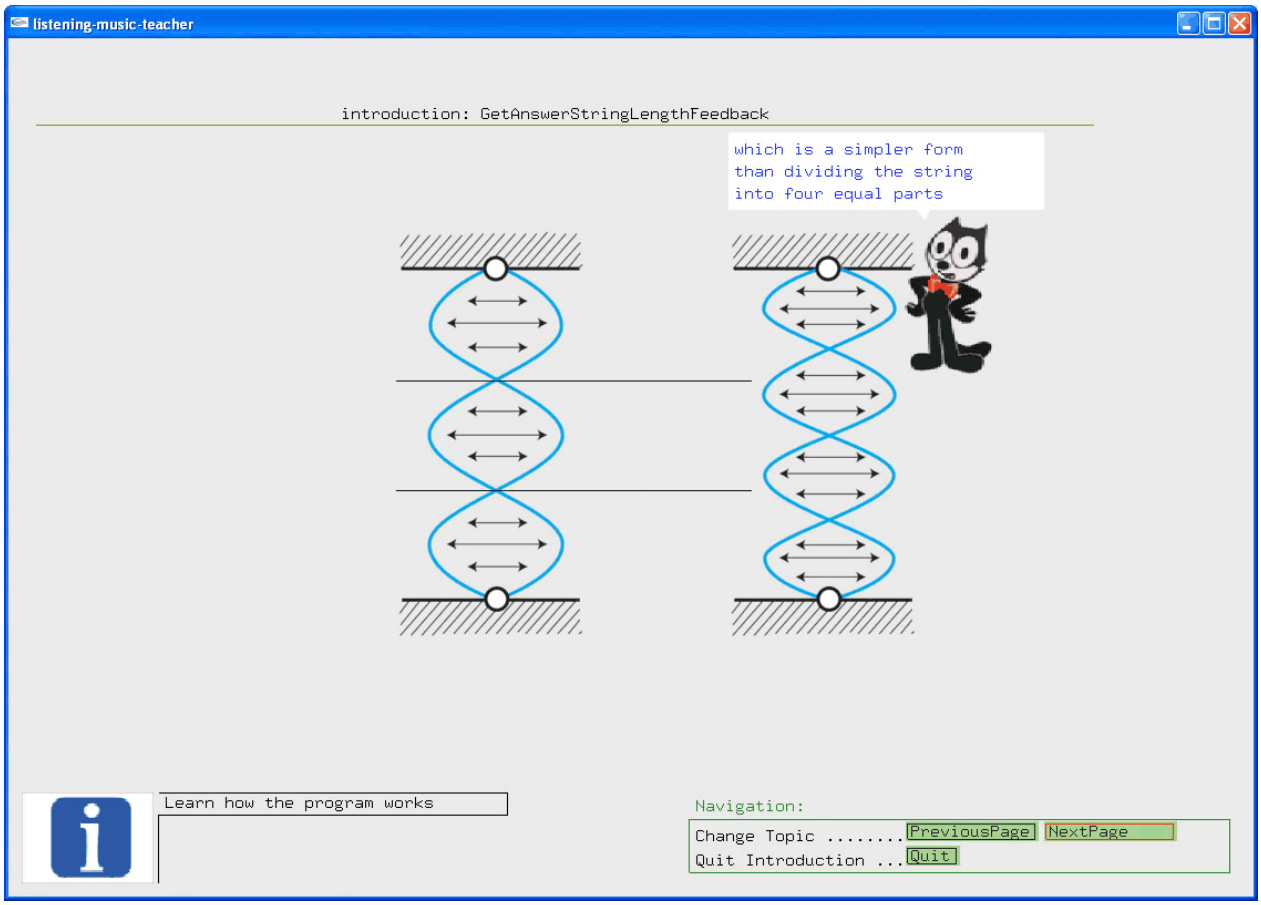
The frequency, with which the whole string swings, is called its natural frequency. For example an open guitar string can be plucked anywhere and the sound produced will be its natural frequency or fundamental.

However, beside the natural frequency, there will be so called overtones. The simplest overtone, the first one, will swing with double the frequency. The first overtone has a string length, which fits twice in the whole string, thus has half the length.

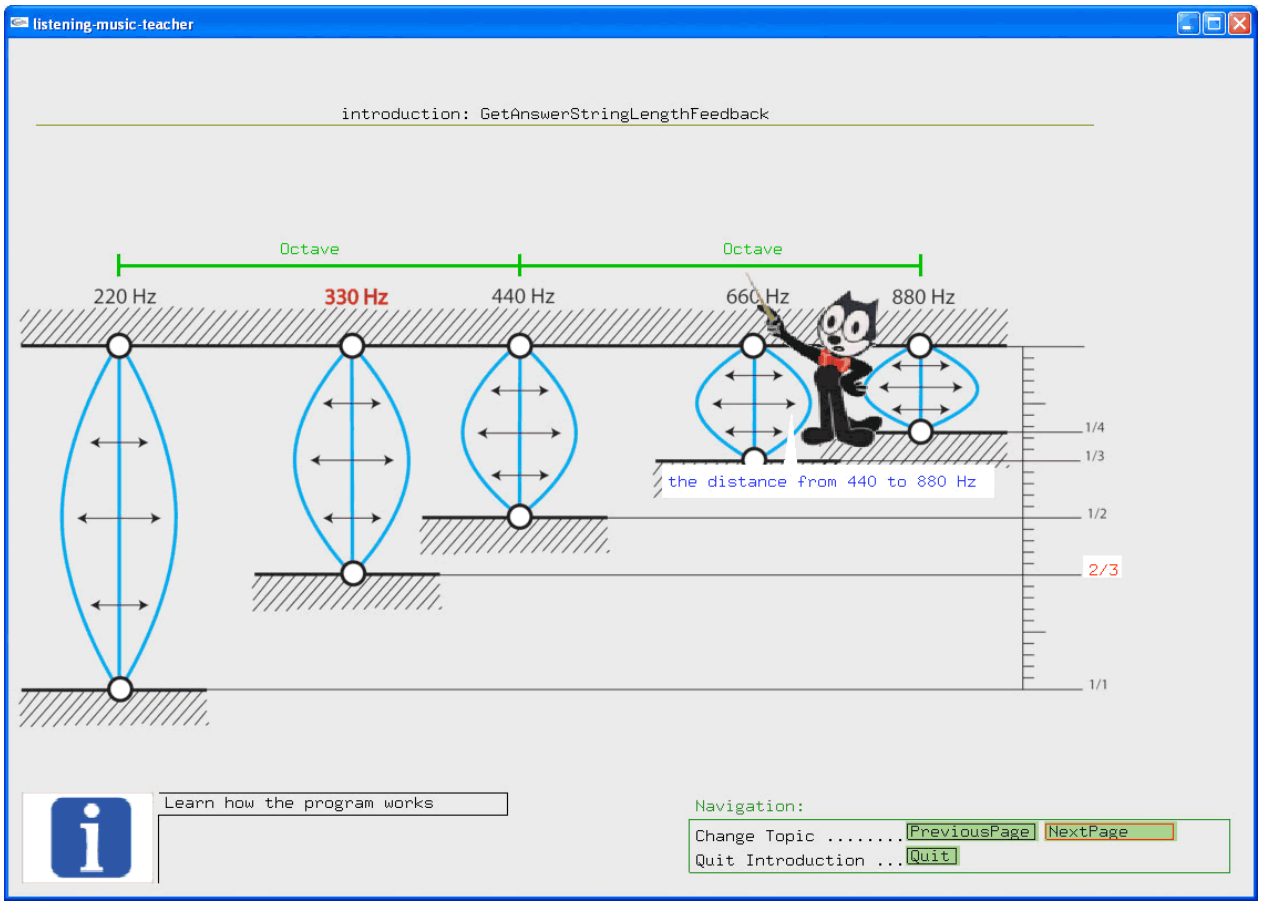


The general rule for the swinging frequency is: The frequency behaves reciprocal to the length.

The simpler the form, the stronger is the overtone. For example a string divided into three equal parts, is a simpler form than a string divided into four equal parts.

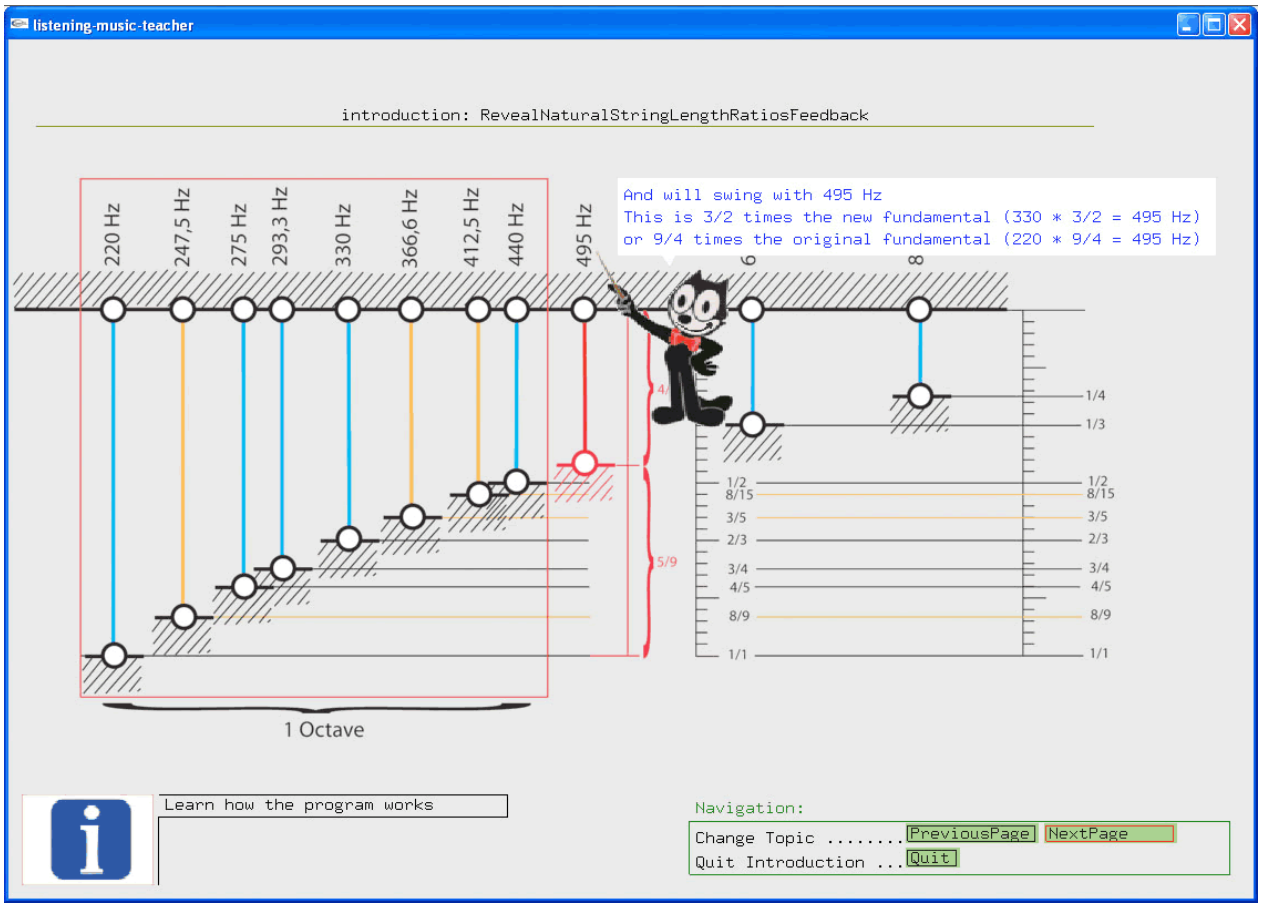


In the following picture are some frequencies in relation to there length depicted. Note that the frequency axe is not linear: a logarithmic scale is used. In this way the distance from 220 to 440 Hz is the same as the distance from 440 to 880 Hz. In musical terms this distance is an octave.

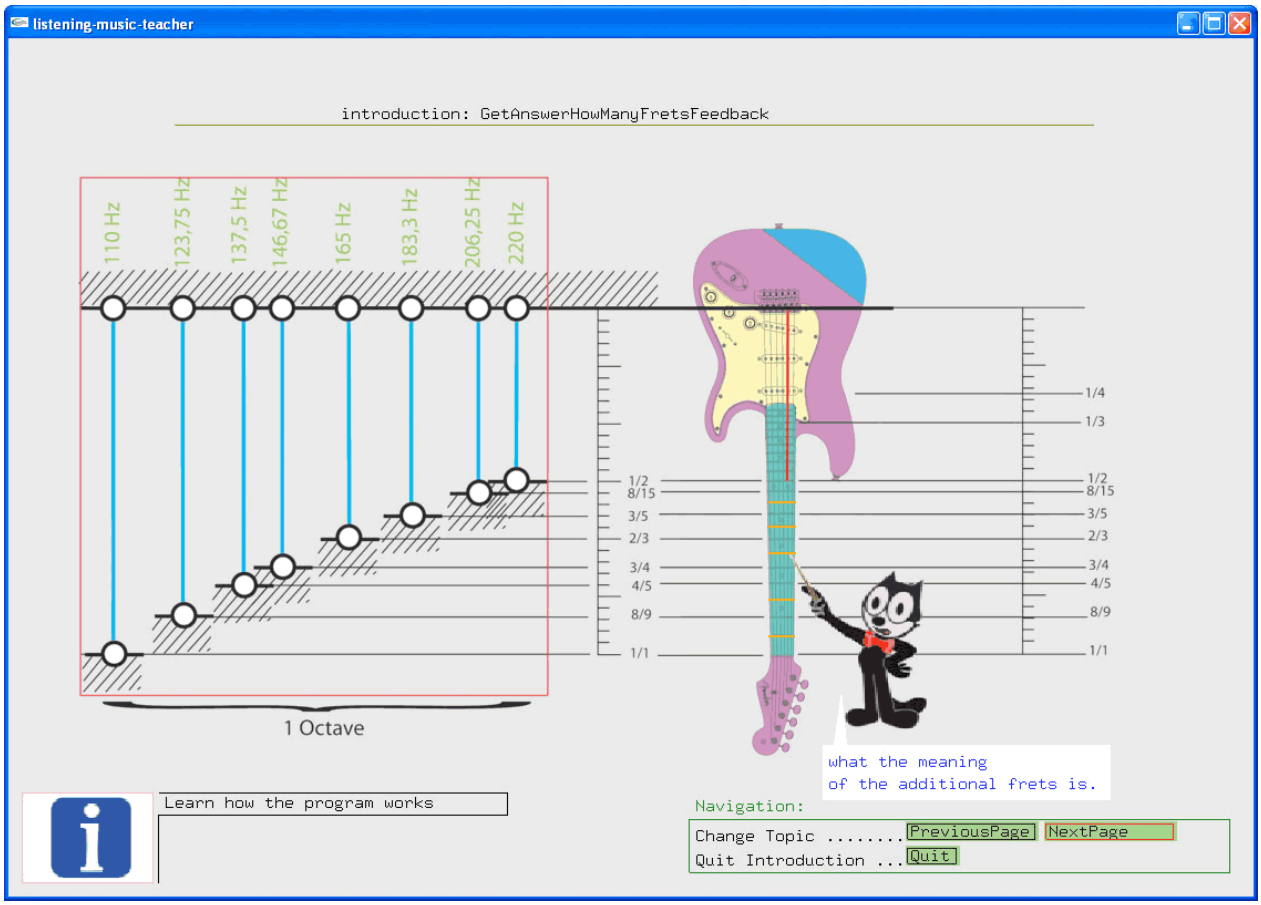


Note that the distance from 330 to 660 Hz is also an octave and has the same length.

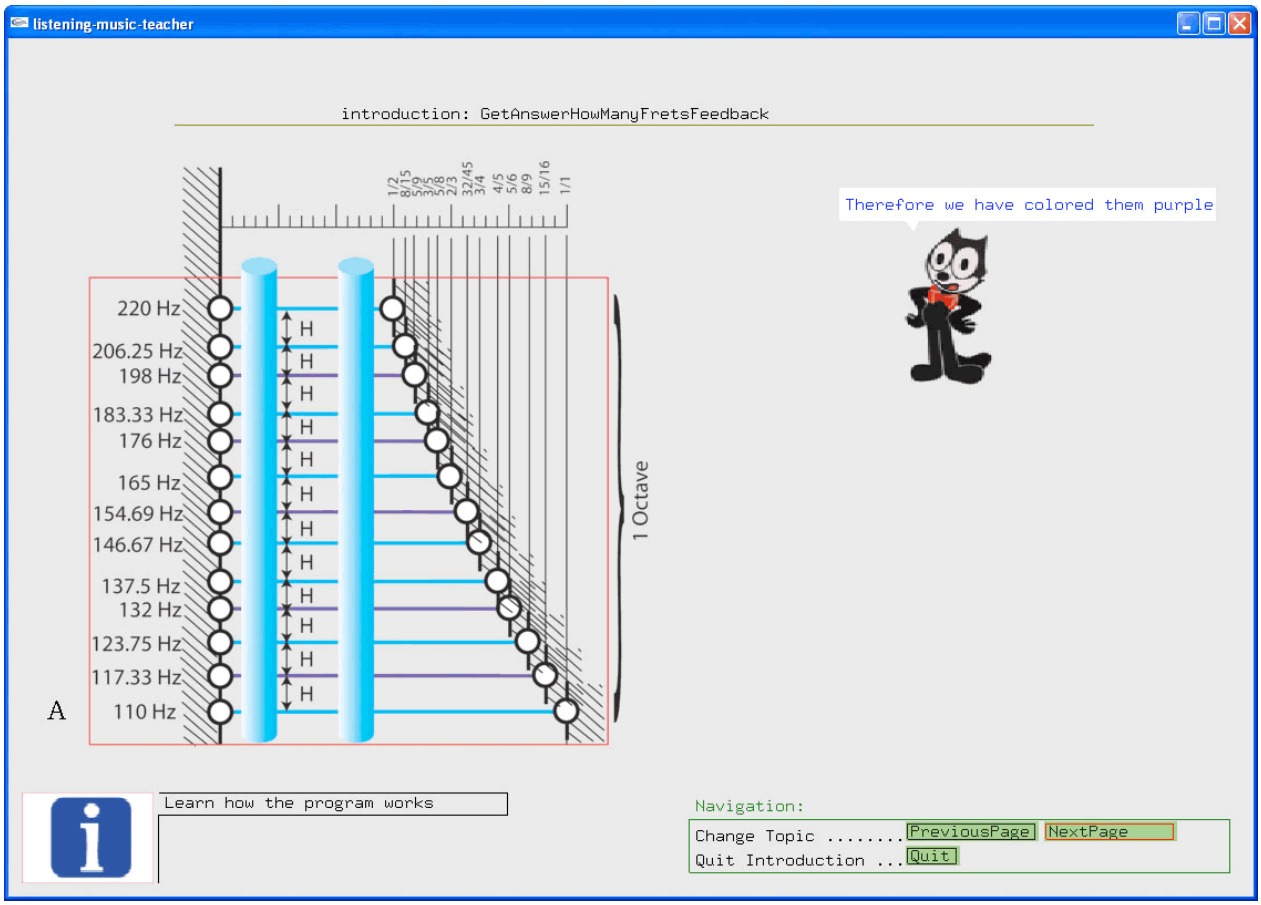
The program reveals the other frequencies of a just intonation scale and shows the relationship between the sounds to the eight notes scale and the four simplest overtones with ratios of 1/2, 2/3, 3/4, und 4/5.



After constructing a complete scale with eight notes, we take a look at a real instrument: The guitar. We see that there are five more frets, which do not get used. With these five notes we can build a chromatic scale, which consists of only half-steps.

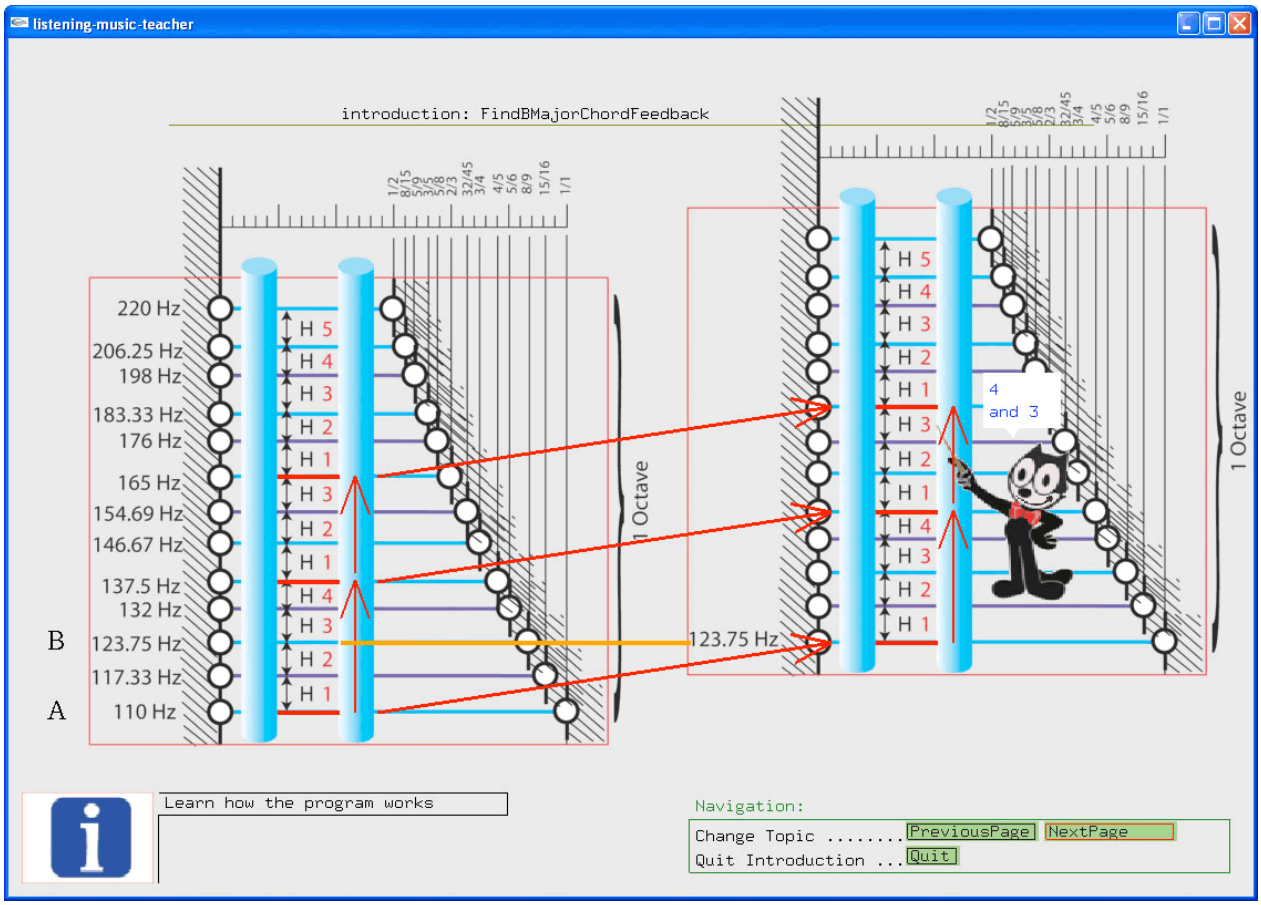


It is very useful to have a chromatic scale, which consists only of half-steps. This allows for easy transposition of melodies. To better see this, the sheet was turned, so that the ratios are now on the top. Two poles on the side were added; in this way it looks more like a ladder.

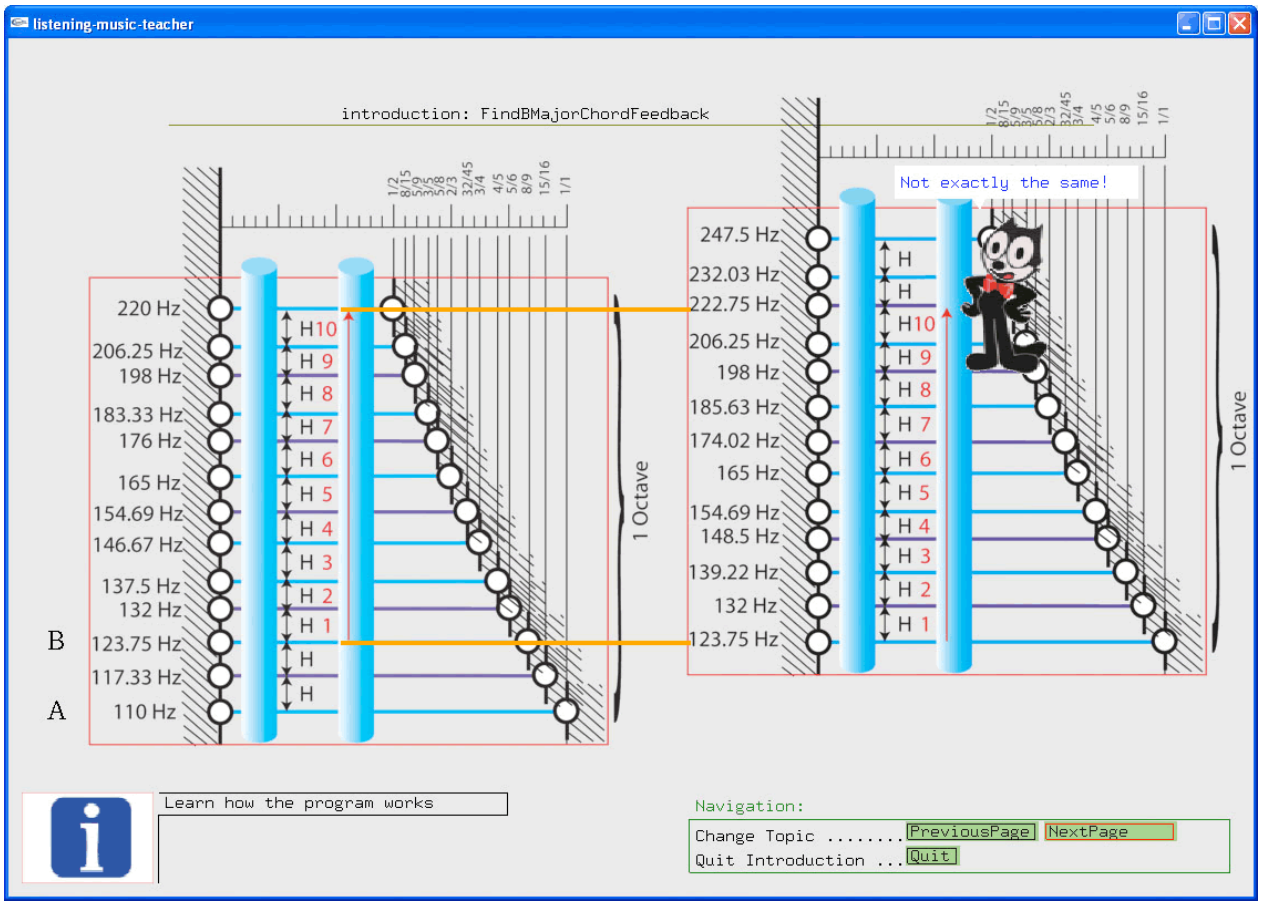


Note that the steps of the five added notes to get a chromatic scale are colored purple.

As an example for a transposition an A Major chord is transposed to a B Major chord. The characteristic of a Major chord in root position is: From the starting note, which also gives the chord the name, go up 4 half-steps and then go up 3 half-steps. That is you add a Major third and then a minor third to the root note.



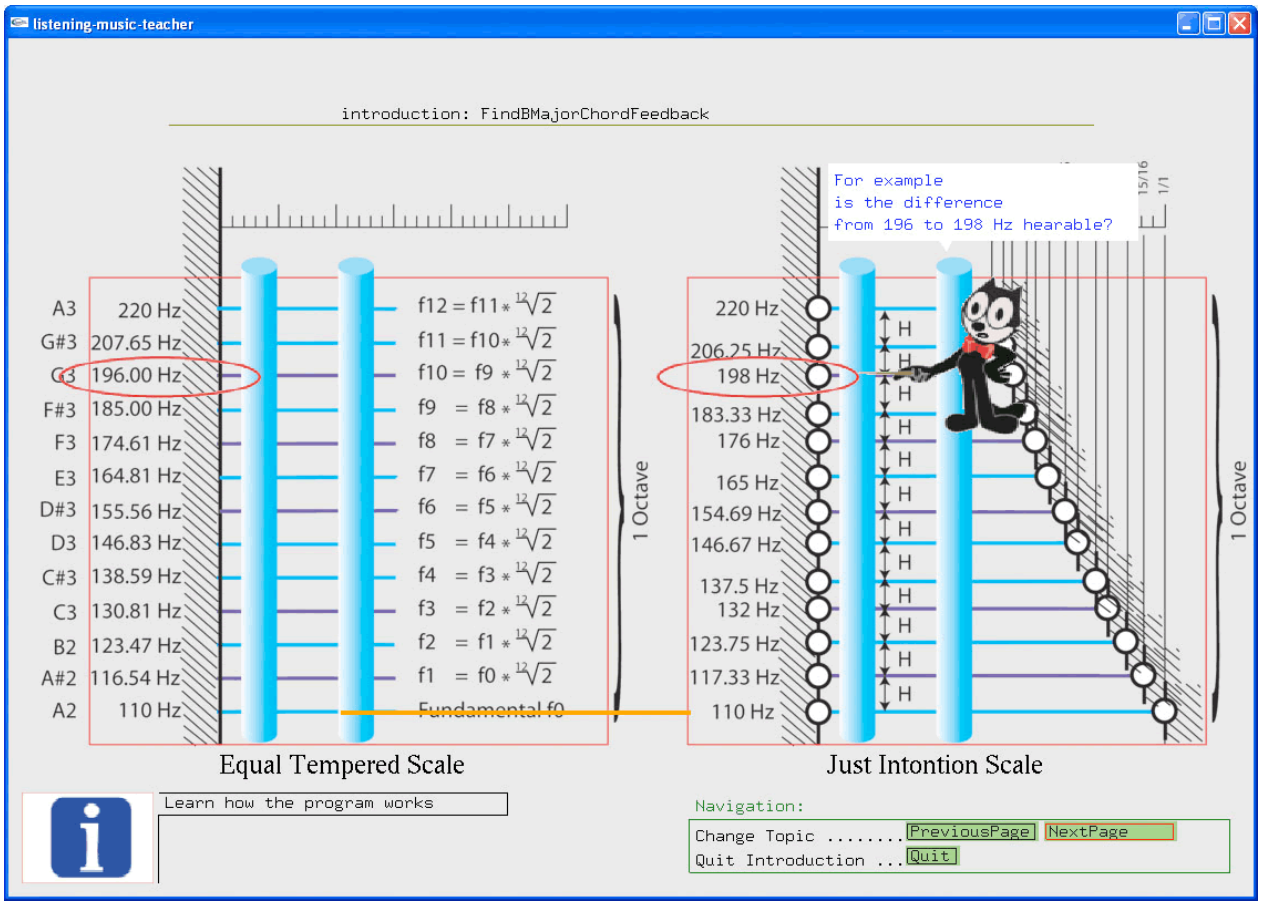
After calculating the frequencies for the ladder steps that starts with a frequency of 123.75 Hz, we see that if we go up 10 half-steps from the note B on both ladders, the frequencies are no more the same.



The reason for the difference is that the steps are not equal sized. This is the result of taking the most dominant overtones, which are built from natural rations, to form a scale. Other ratios could have been taken, which would come much closer to an equal sized stepped ladder. However, this would deviate from the preferred swinging frequencies of nature. The nature favors simpler forms over more complex forms.

To resolve this conflict, the musicians have invented the equal tempered scale. In this scale the half-steps are all of equal size. The factor to come from one step to the next is the twelfth root of two. This is a compromise between the natural laws of physics and the ease to transform music.

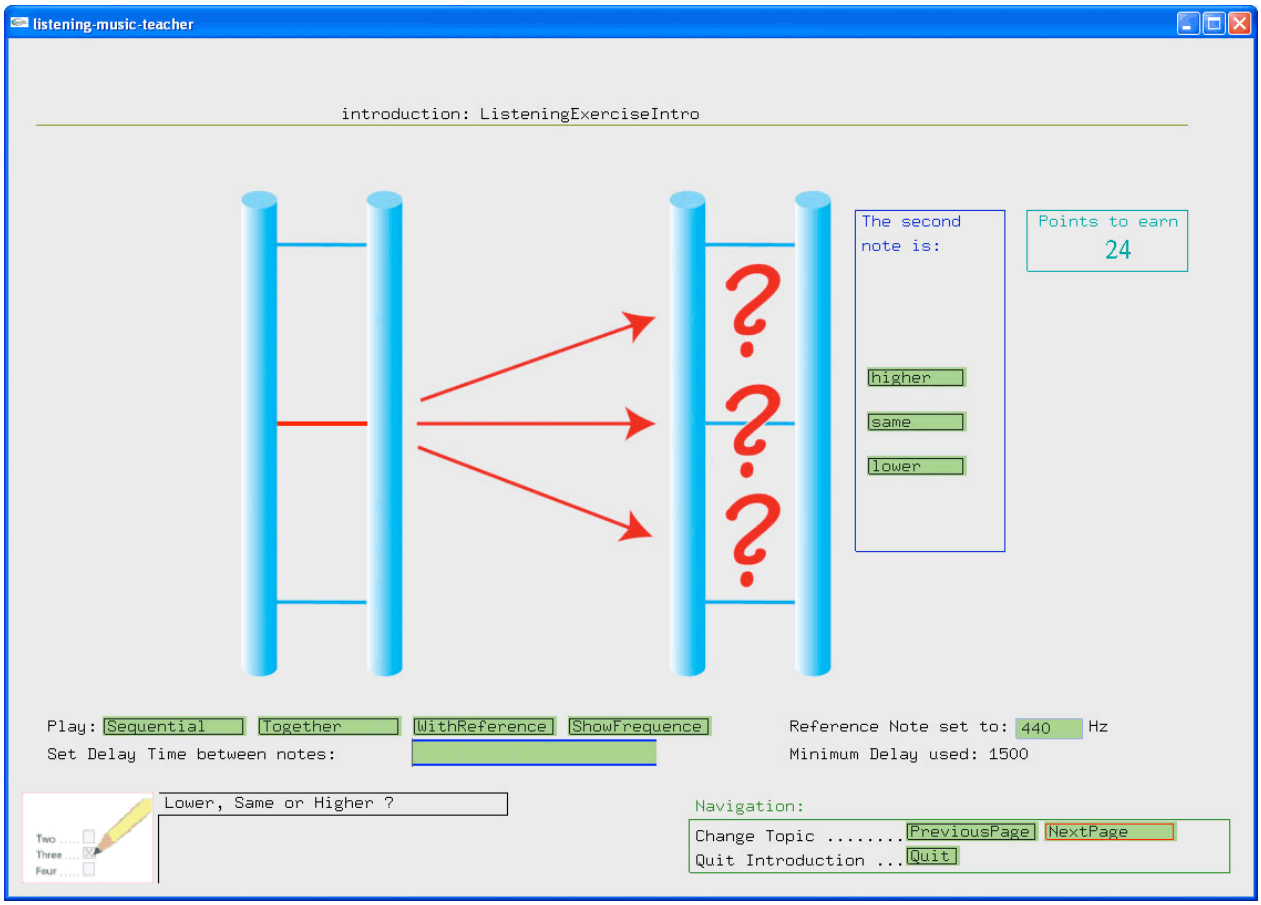
If we compare the frequencies of an equal tempered scale with a just intonation scale we see that the differences are very small.



Nevertheless, we make a test to see if we can hear such a small difference.

Since ear training is an important part of music understanding, we have introduced a new method: The Precision Listening Method. Our ear training method forces you to listen really carefully: after hearing two consecutive pitches, with a variable pause in between, you must indicate whether the second pitch was higher, lower or the same than the first pitch. Starting with the distance of a half step, in the first ear training exercise, the pitches to discern get closer with following ear-training exercises. Until you have to discriminate pitches that are only 12 cents apart. The last ear training session lets you differentiate pitches up to 1 cent. In this last exercise the distances are randomly chosen, and are no more in relation to the equal tempered scale. That is the starting pitch does not necessarily coincide with a pitch assigned to a note in the equal tempered scale. In addition, you have to keep the first pitch very close in your mind, since by moving the slider to the matching position, the pitch of the slider position will be sounded. Thus this sound will distract you from the first sound that you have to keep in mind.

In the ear training exercises you only have to decide if the second sound is lower, higher or the same as the first sound.

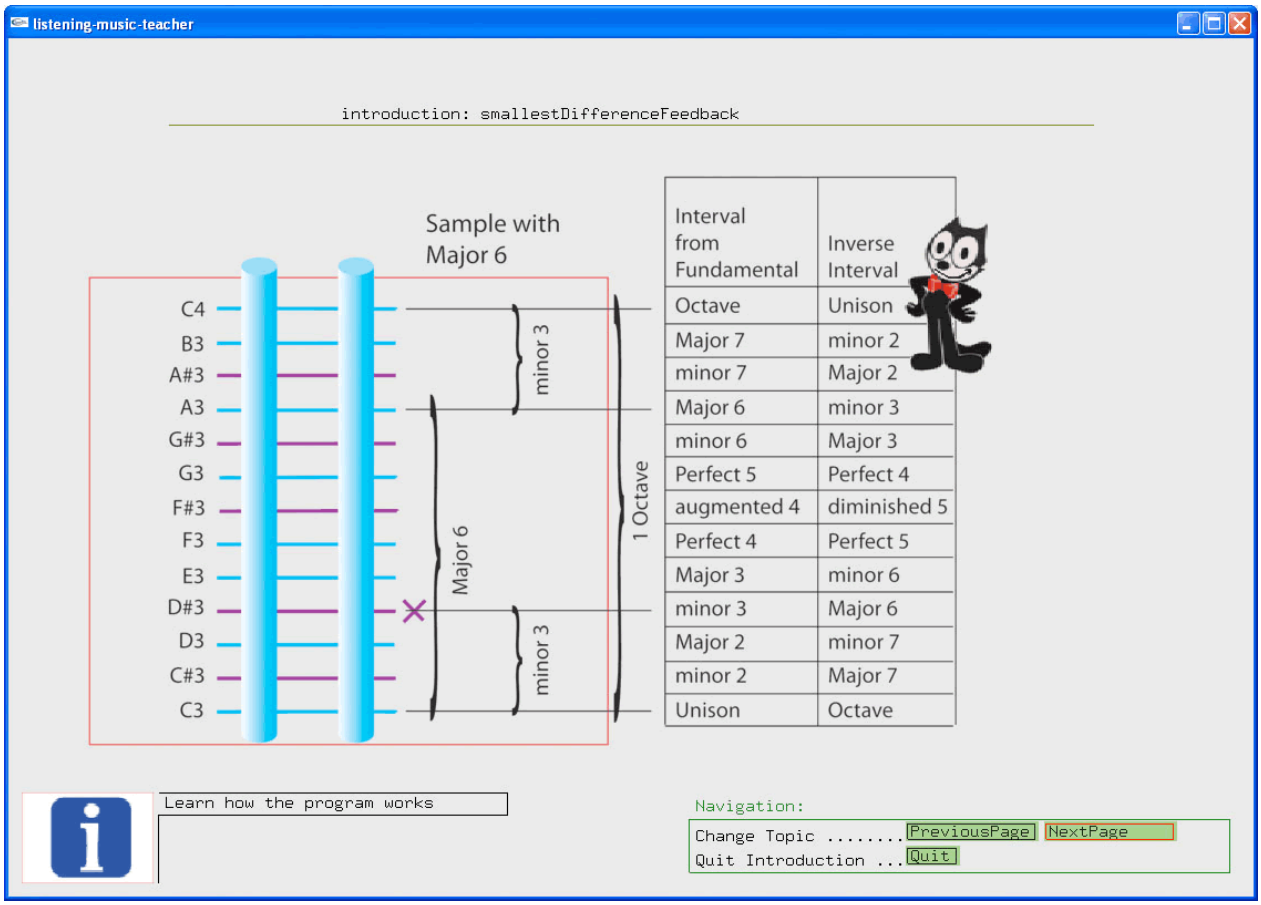


In the exercise you have the possibility to change the time between the notes. The shorter the time frame between the notes the easier it gets to solve the problem. In addition you can play both notes simultaneously to hear an overlapping frequency that results if the frequencies are not the same. You can also hear the notes together with a reference note. With this last feature you should be able to hear a hauling effect of 2 Hz respectively of 4 Hz if you set the reference frequency to 200 Hz.

So, indeed, the difference is easy hearable within a special context, whereas it is very hard to hear on its own.

Even so, the difference are hearable, the musicians preferred the equal tempered scale to the just intonation scale. Imagine: In just intonation a piano would have to be retuned, every time you would play a piece of music in another key.

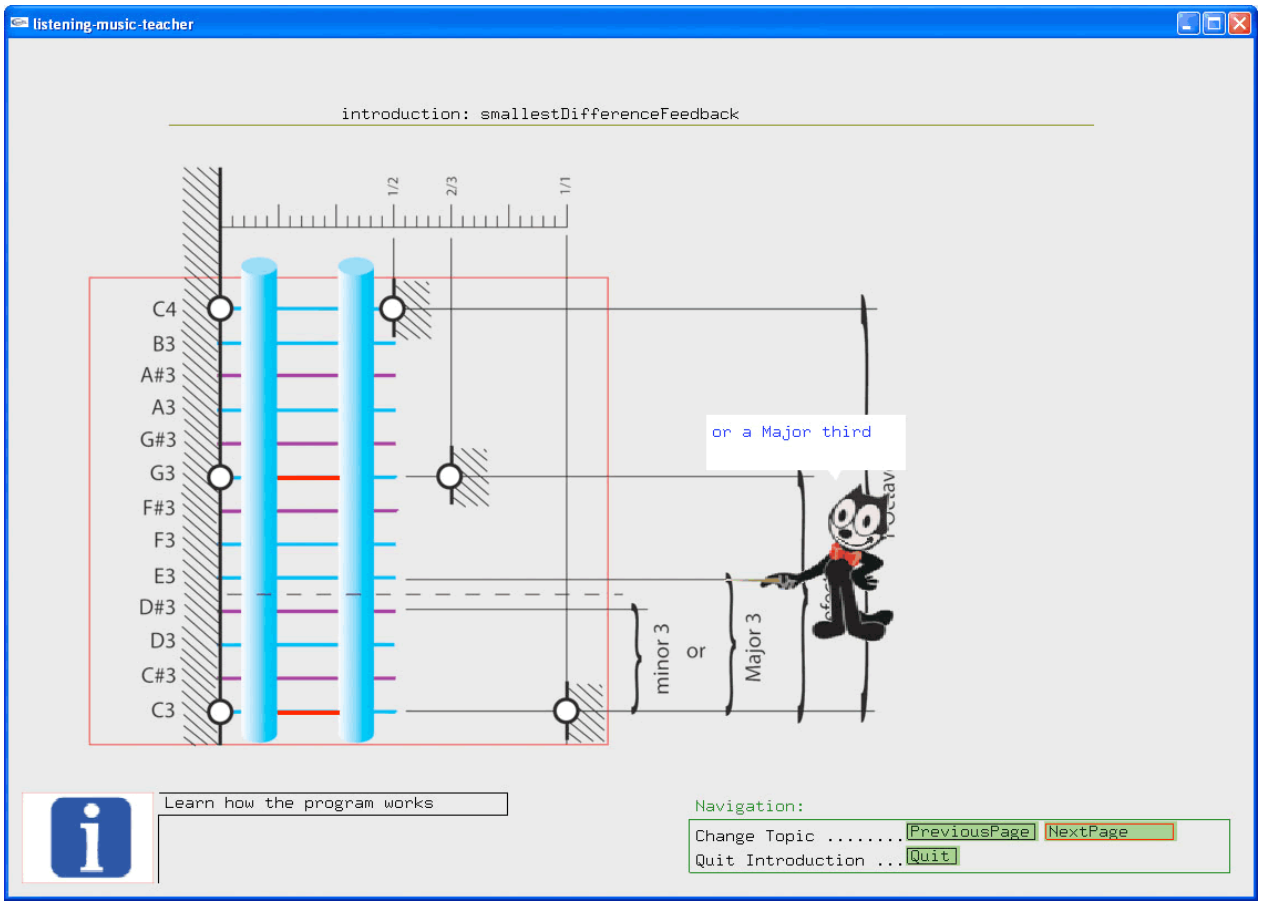
The frequency difference for a perfect fifth or a perfect fourth for the just intonation scale from the equal tempered scale are only 0.113 %. However this is not the reason why these intervals are called perfect.



The real reason why these intervals are called perfect is: Any inverse interval, - taken from the root note to a note, which lies in the scale (a blue step) -, applied from the root note will end up on a note, which is not part of the eight note scale (a purple step).

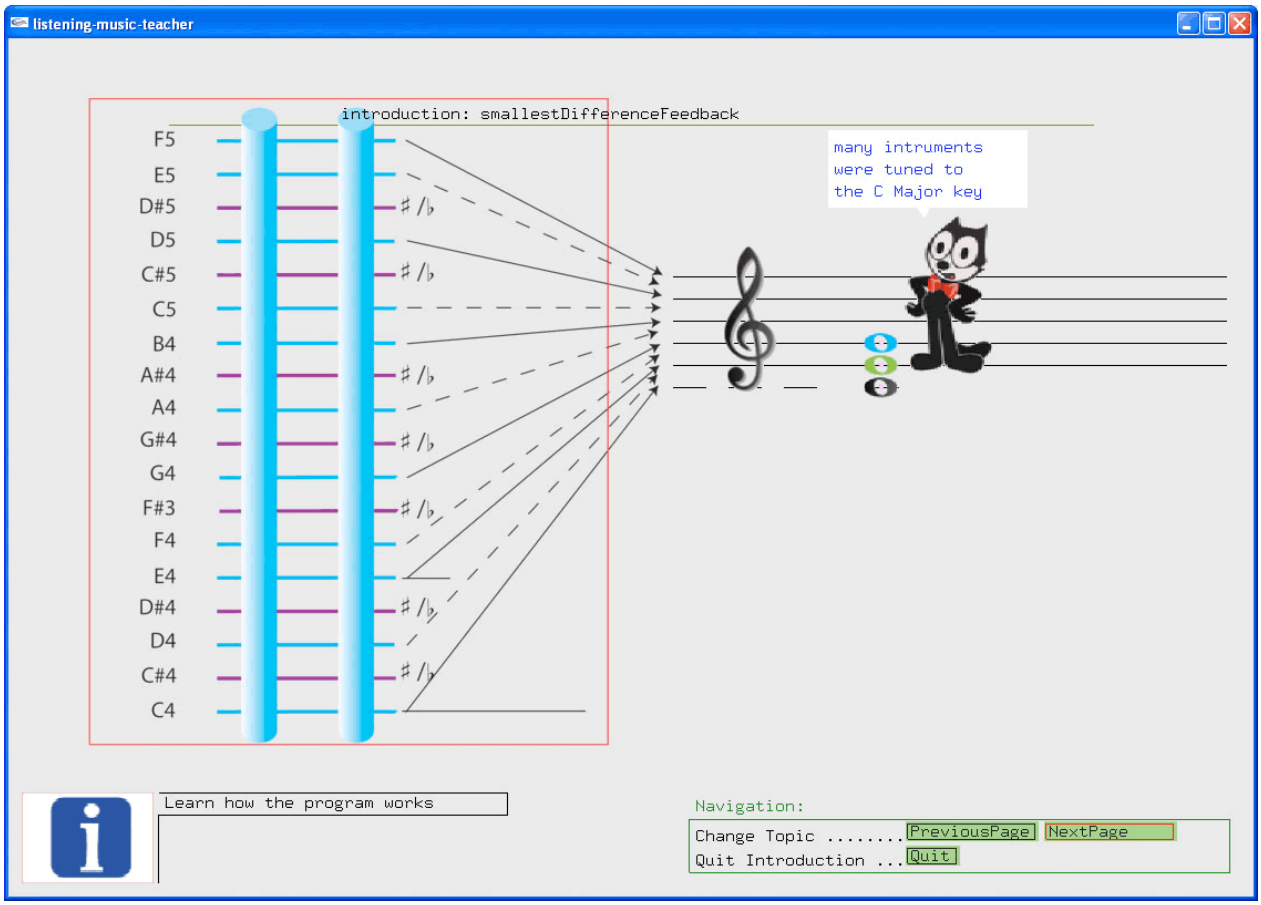
Unless, the starting interval is a perfect fourth or fifth: In this case the inverse interval applied from the root note will also end on a blue step. Of course the Unison and the octave are also perfect according to this definition.

In real live, overtones are always present. Through the laws of physics, the first overtone, the octave, is so prevailing that it is used to divide the frequency spectrum into octaves. The second overtone, the fifth, is also prevailing in nature and thus sounds familiar to us. Therefore the fifth plays a very important role in music.

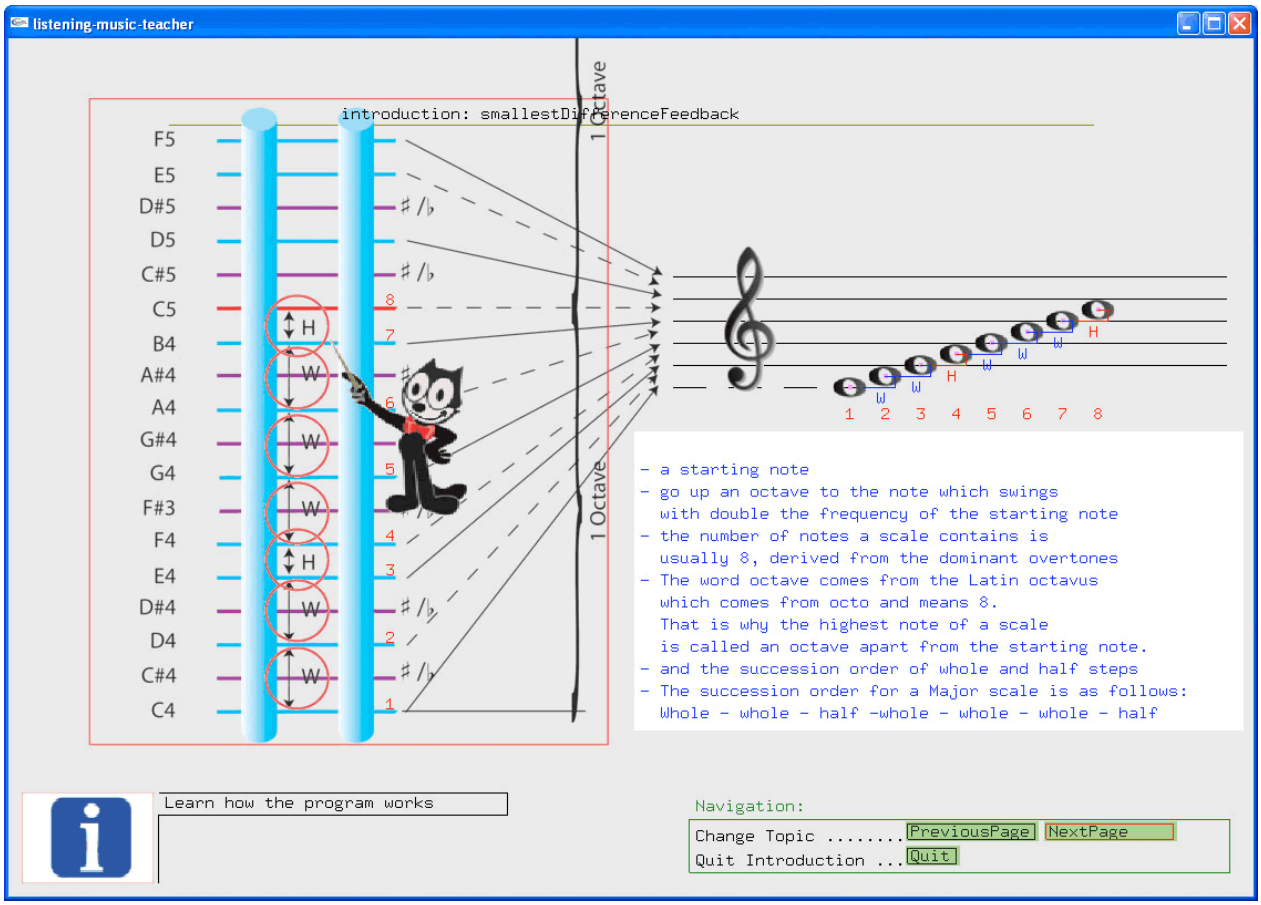


The fifth is part of the most common chords: the Major triad and the minor triad. To complete the triad a note in the middle between the root note and the fifth is necessary. This could be either a minor third or a Major third. The fifth is divided into a minor third and a Major third. The Major third has the note in the scale on a blue step. If we take the minor third as a first interval, then the second interval is a Major third. The first third gives the triad the name: e.g. Major or minor. The fifth is taken for granted, so that it does not even have to be mentioned in the triad name at all.

In the last part of the theory lesson, the relationship between the ladder and the staff is shown.



Since at the time of the invention of the equal tempered scale many instruments were tuned to the C Major scale, the octave numbering does not start from A but goes from C to C. Also notice that pieces written in the Key of C Major do not use any sharps or flats.



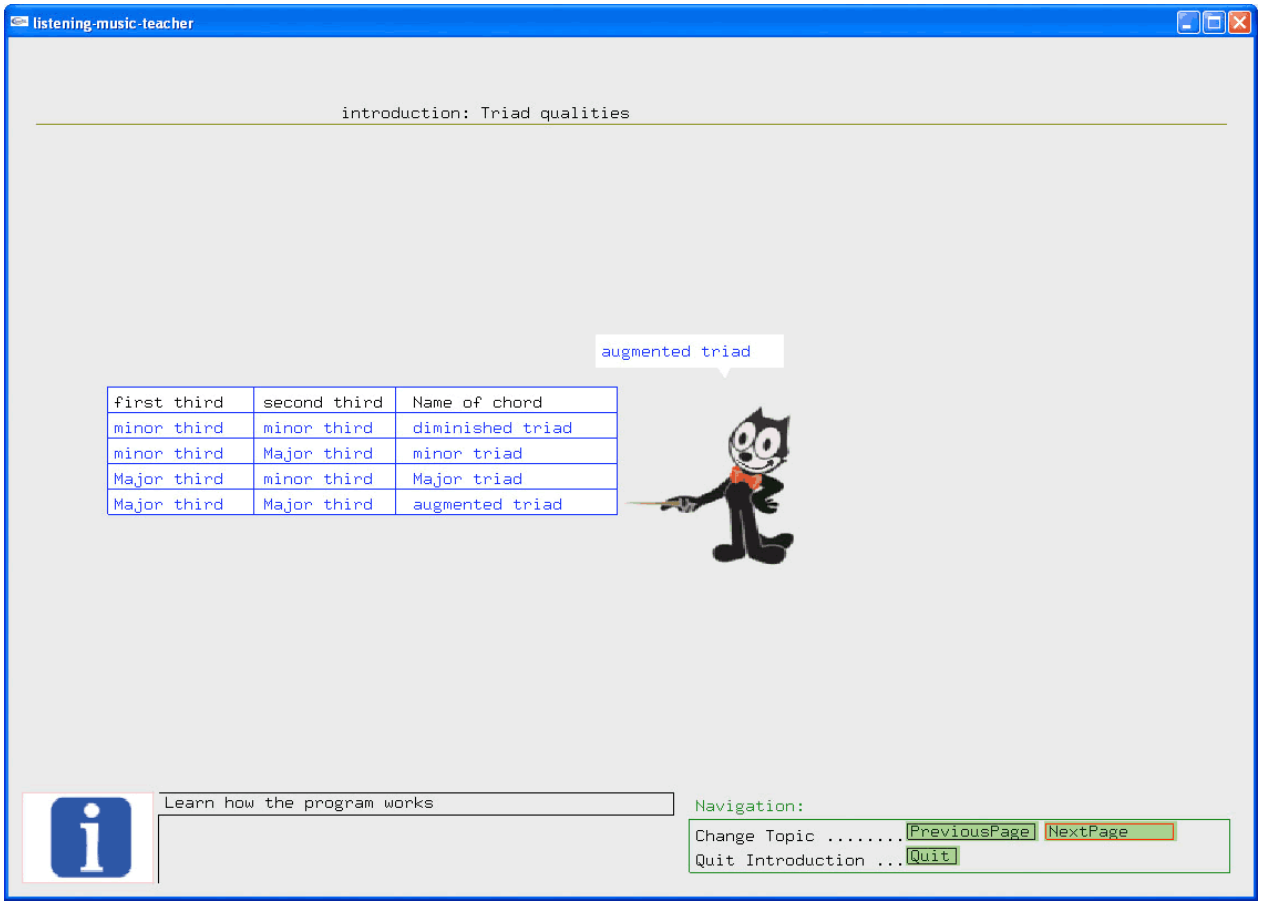
The characteristic of a Major scale is defined by the succession order of whole and half-steps. For a Major scale the succession order is: Whole – whole – half – whole – whole – whole – half.

In the next lesson “Introduction Chords” we will have a closer look into triads and seventh chords.

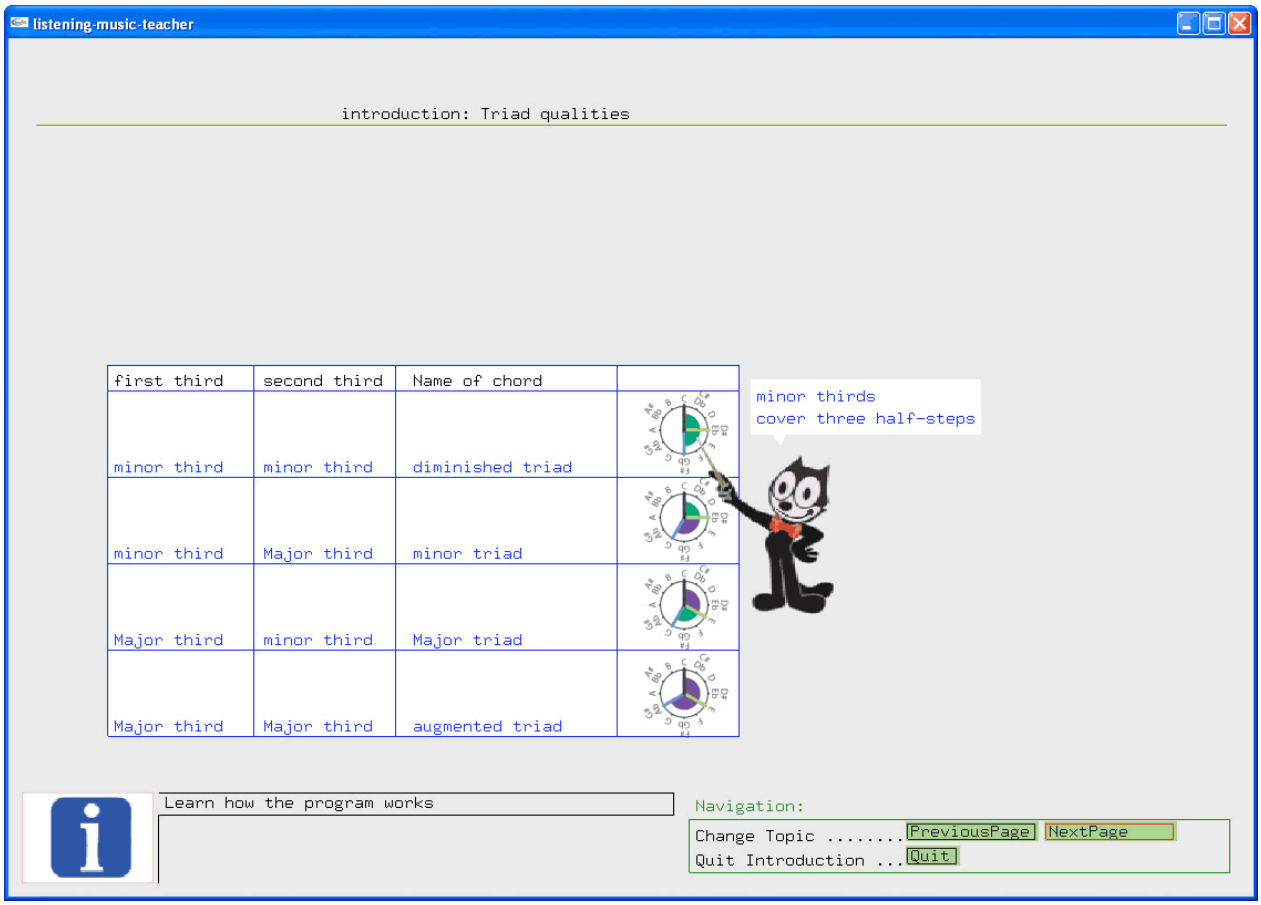
Introduction Chords

This lesson explains the most common chords: Tertian triads. The quality of a triad can be: minor, Major, augmented or diminished. The lesson then explains inversions: root position, first inversion and second inversion. The lesson continues with an explanation of seventh chords: By adding another third on top of a triad, we get a seventh chord.

Triads consist of two thirds. The third can be either minor or Major. There are four combinations possible:

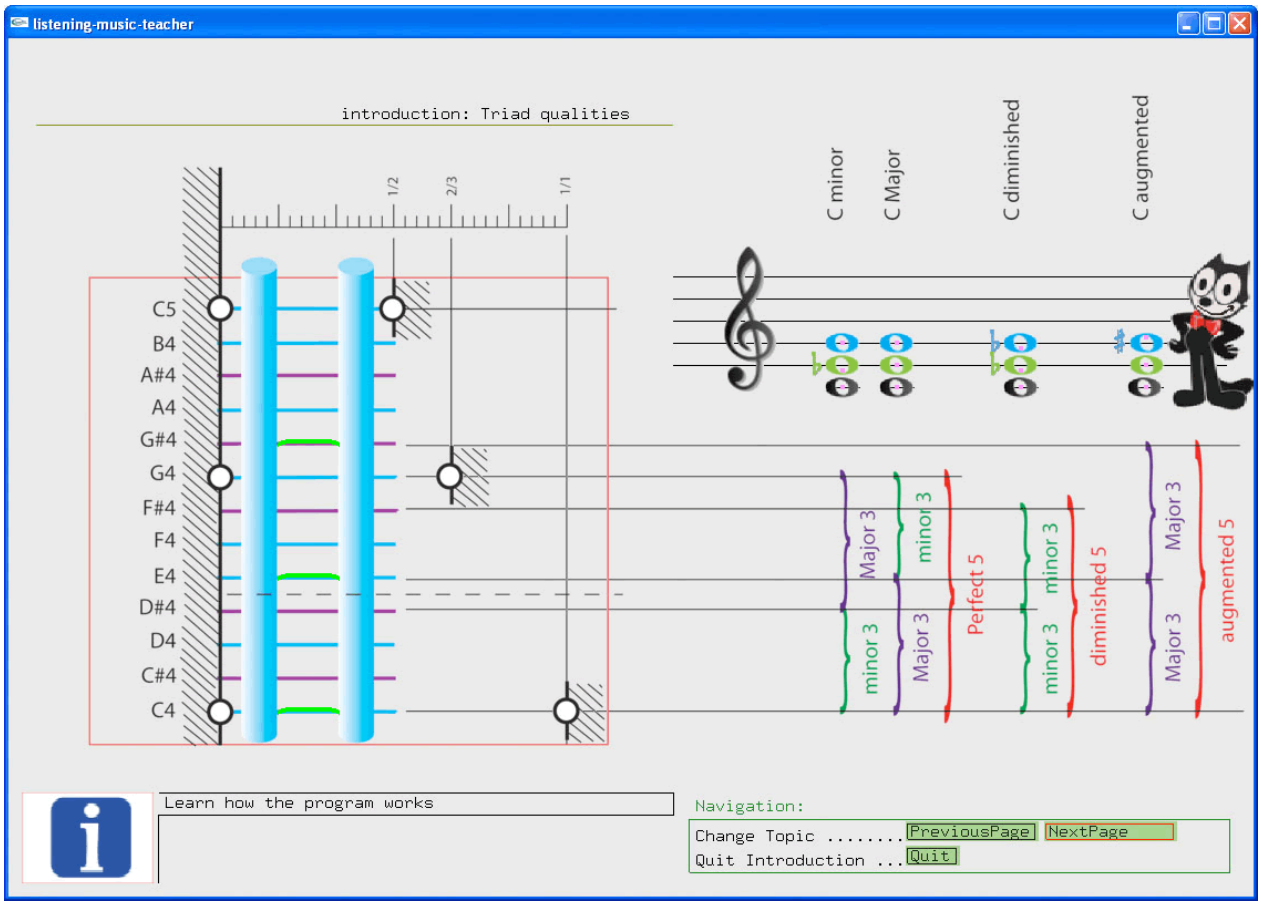


The combination of two minor thirds will result in a diminished fifth. Therefore the name of the triad is: Diminished triad. If the thirds add up to a perfect fifth the name depends on the starting interval. A minor third in the lower part and a Major third in the upper part are called a minor triad. And as we already know a Major third and a minor third is called a Major triad. And finally two Major thirds add up to an augmented fifth and are therefore called an augmented triad.

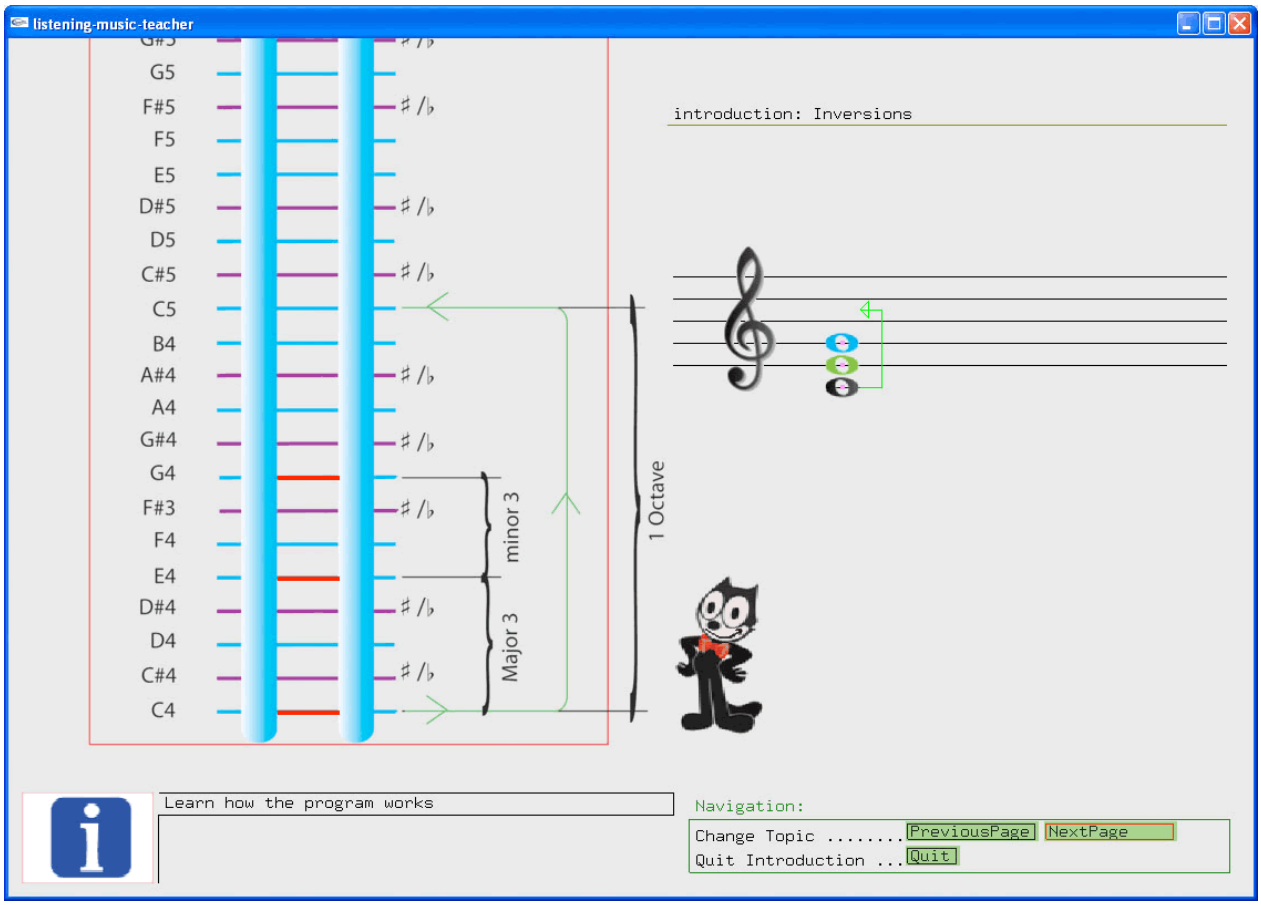


Here the triads depicted with a graphical representation.

In the following picture the qualities of triads are shown on the staff.

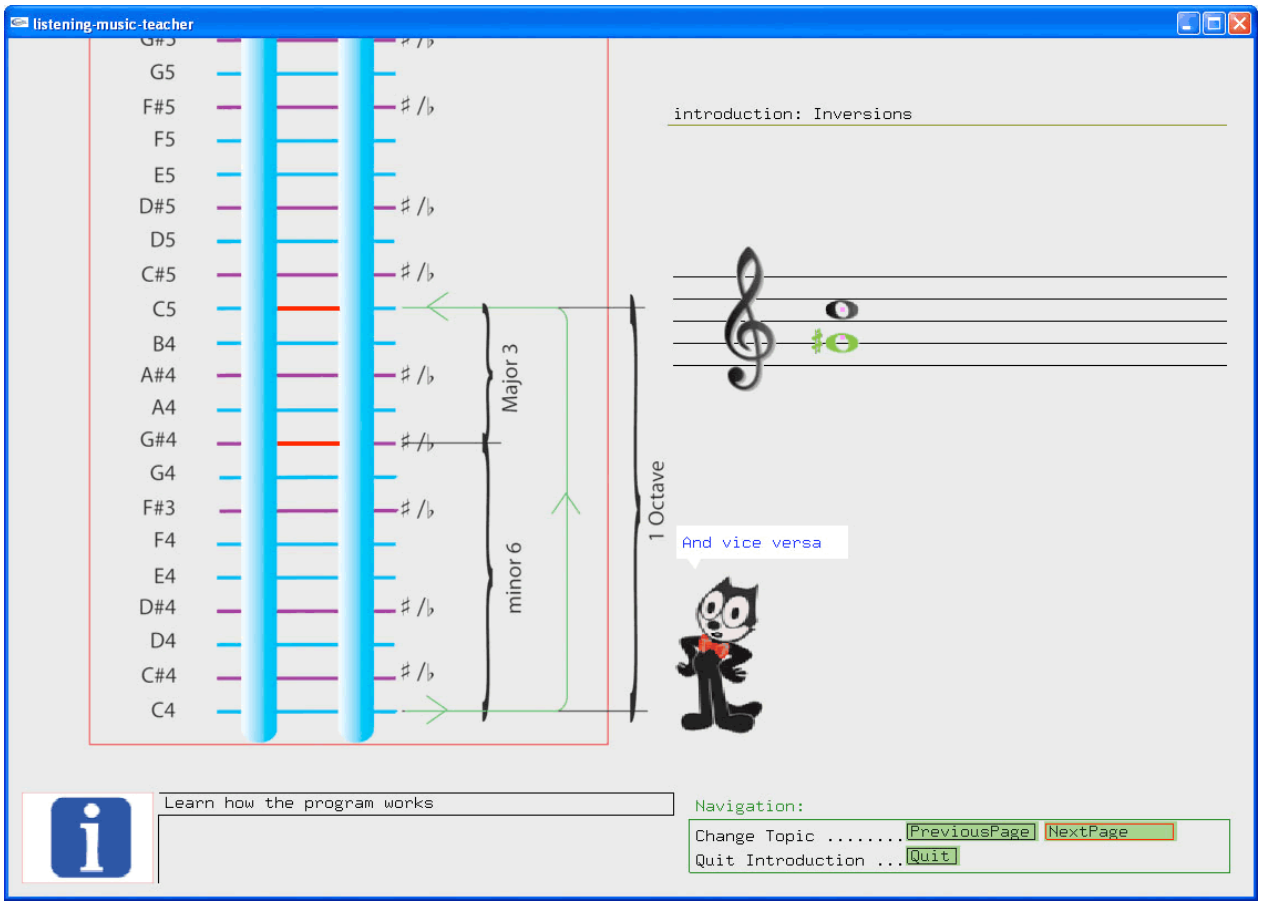


To form a diminished triad in the key of C Major requires to flats. And to depict an augmented triad on the staff requires a sharp. The use of flats and sharps is by intention: the accidentals visualize the diminishing or the augmentation.



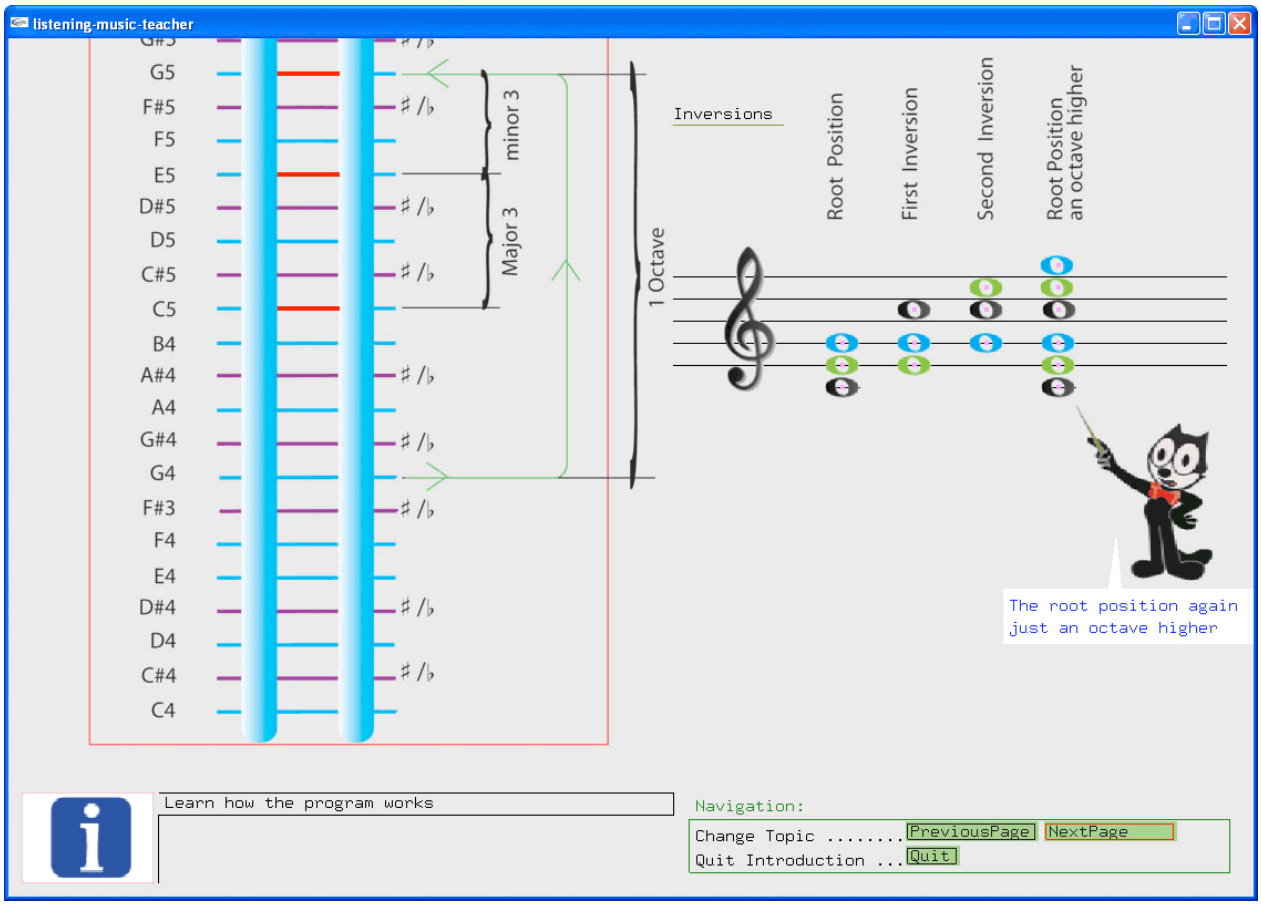
Inversion means that you have to raise the lowest note an octave higher. That is you raise the note to its own first overtone. That means we replace the note with a note that swings with double the frequency of the root note.

For inverting intervals we can see the following behaviors:

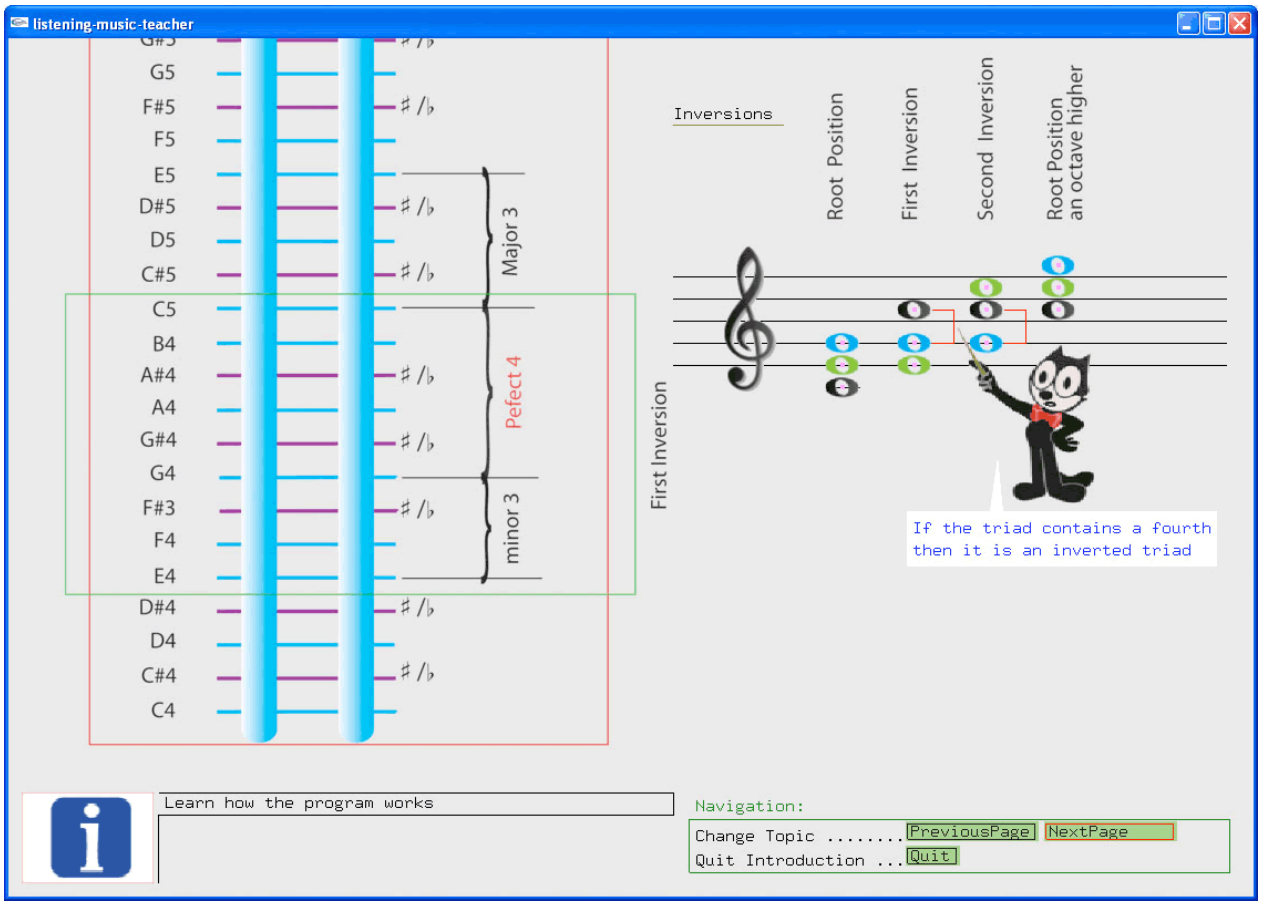


- Major intervals get minor intervals, and vice versa.
- Augmented intervals get diminished intervals, and vice versa.
- Perfect intervals stay perfect.
- Adding the interval numbers of the interval and its inverse interval always gives 9. For example a minor 6 and a Major 3 results in 6 plus 3 equals 9.
- And of course adding an interval and its inverse interval gives by definition an octave.

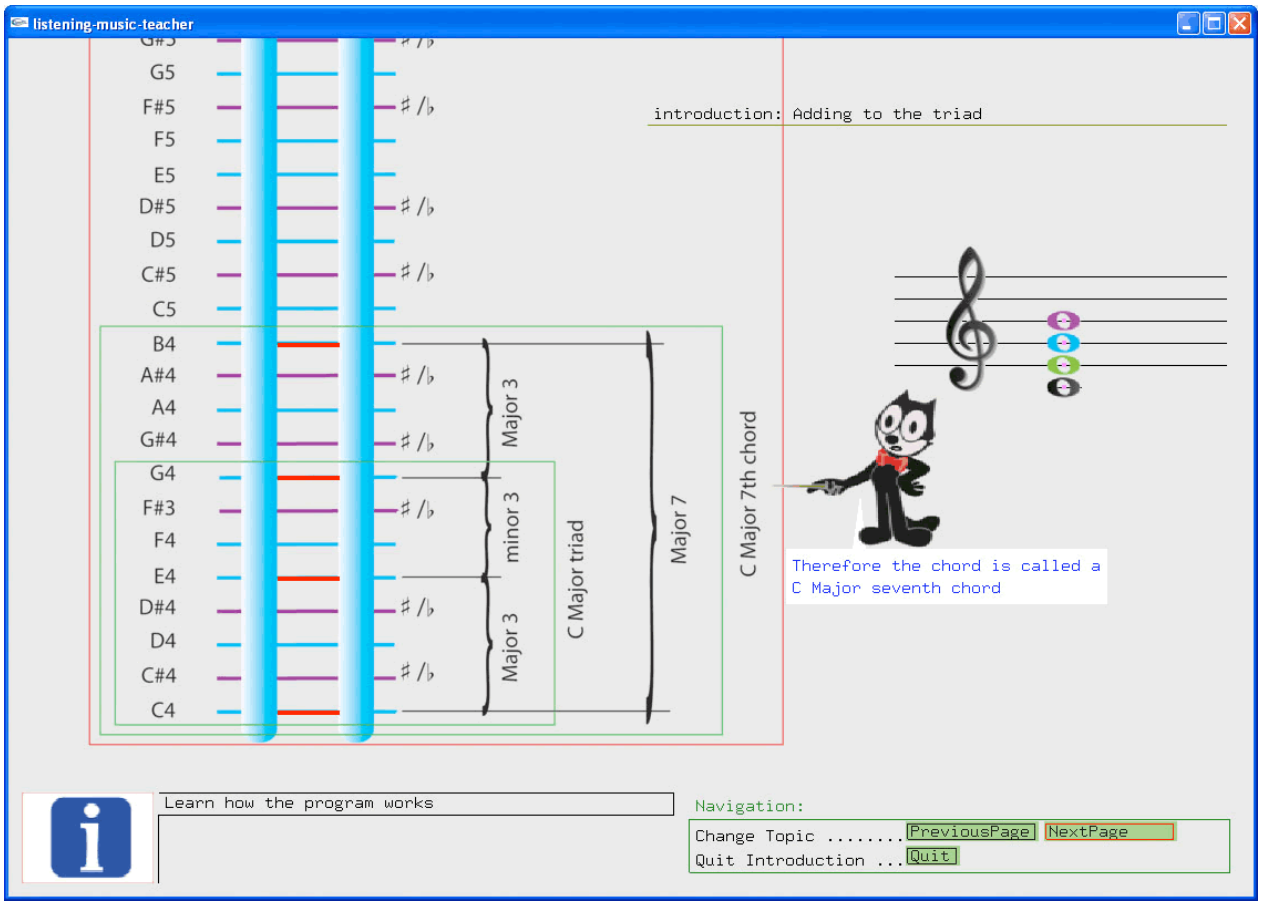
A triad contains two intervals. We can make two inversions before we come back to the starting root position.



As an example the C Major chord gets inverted. The starting position, a stacked up Major third and a minor third, is called the root position. The lowest note in this position is called the root note; here depicted as a black note. As we can see the third inversion leads to the same arrangement as the root position. All qualities of a chord, that is minor, Major, diminished or augmented, can be inverted. Note that inversions do not change the note names, only the octave of the note changes. The qualities are distinguished by at least on note name.

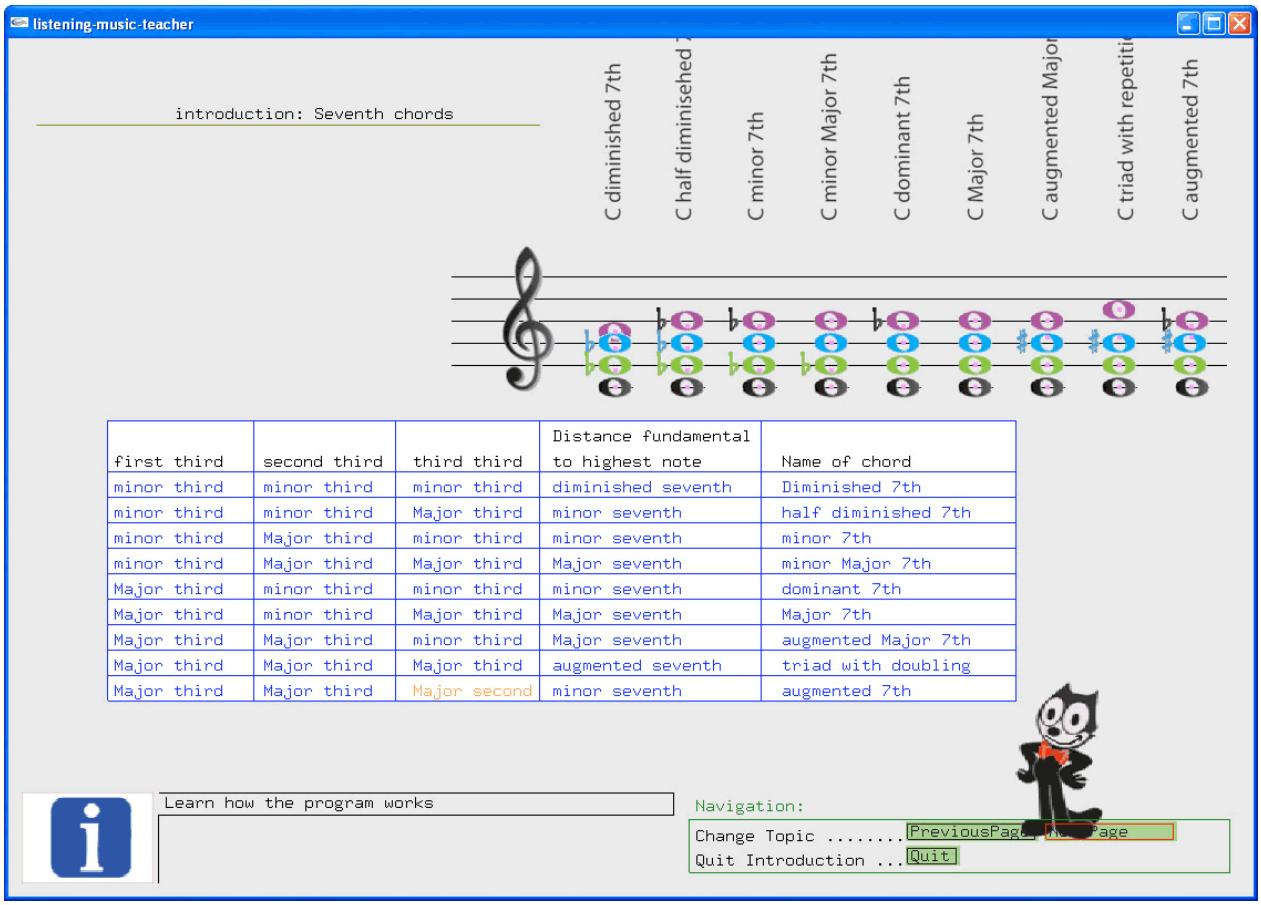


We can recognize that a triad is an inversion, if the triad contains a fourth. If the fourth is in the upper part, then the triad is in its first inversion. Otherwise the triad is in its second inversion.



If we add another third on top of a triad, - in the above example a Major third is added to a Major triad -, the interval from the root note to the new note is a Major seventh. Therefore the chord is called a C Major seventh chord.

A seventh chord contains three thirds. Therefore, eight combinations are possible:



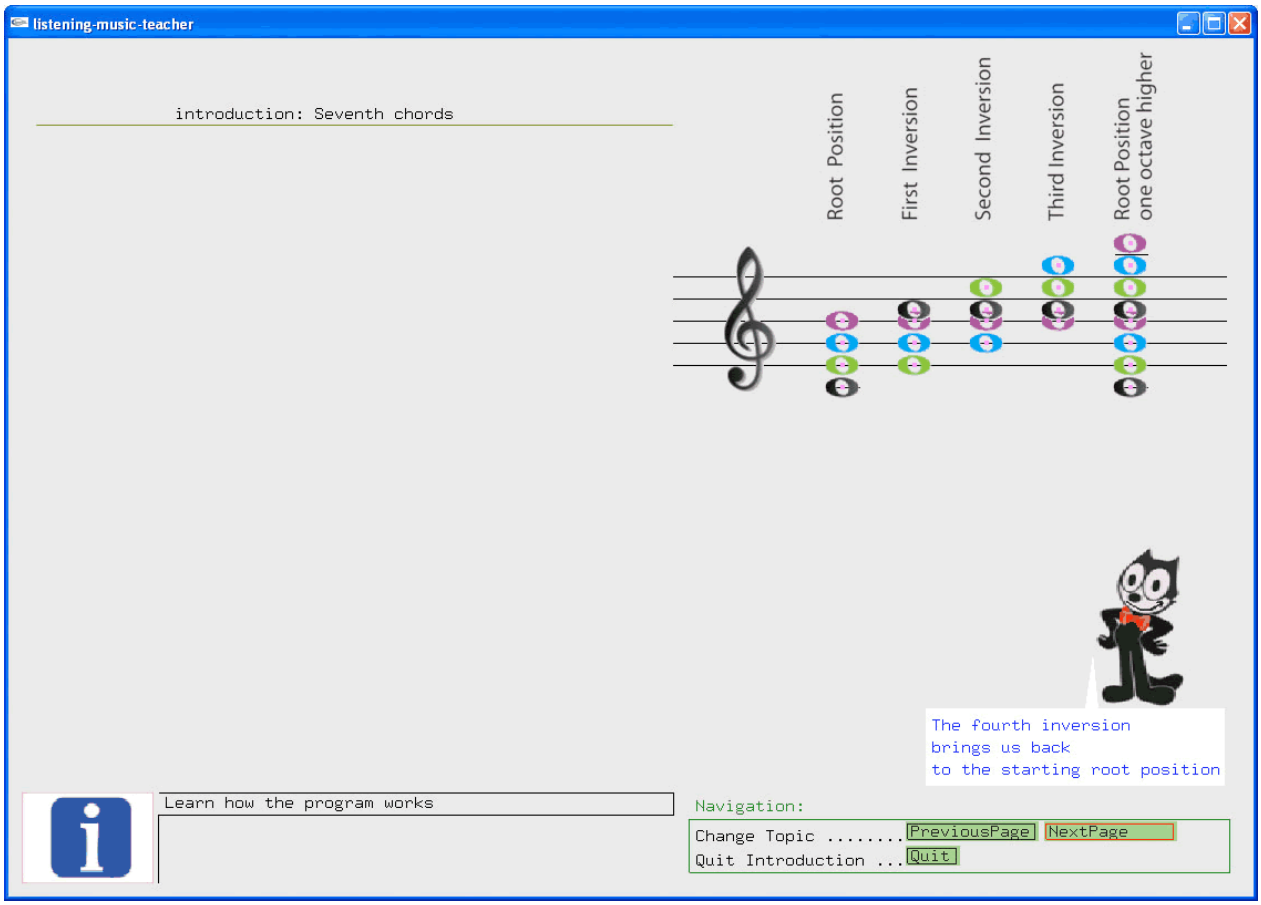
first third	second third	third third	Distance fundamental to highest note	Name of chord
minor third	minor third	minor third	diminished seventh	Diminished 7th
minor third	minor third	Major third	minor seventh	half diminished 7th
minor third	Major third	minor third	minor seventh	minor 7th
minor third	Major third	Major third	Major seventh	minor Major 7th
Major third	minor third	minor third	minor seventh	dominant 7th
Major third	minor third	Major third	Major seventh	Major 7th
Major third	Major third	minor third	Major seventh	augmented Major 7th
Major third	Major third	Major third	augmented seventh	triad with doubling
Major third	Major third	Major second	minor seventh	augmented 7th

The combination yield the following seventh chords:

- diminished 7^{th}
- half diminished 7^{th}
- minor 7^{th}
- minorMajor 7^{th}
- dominant 7^{th}
- Major 7^{th}
- Augmented Major 7^{th}
- Triad with doubling

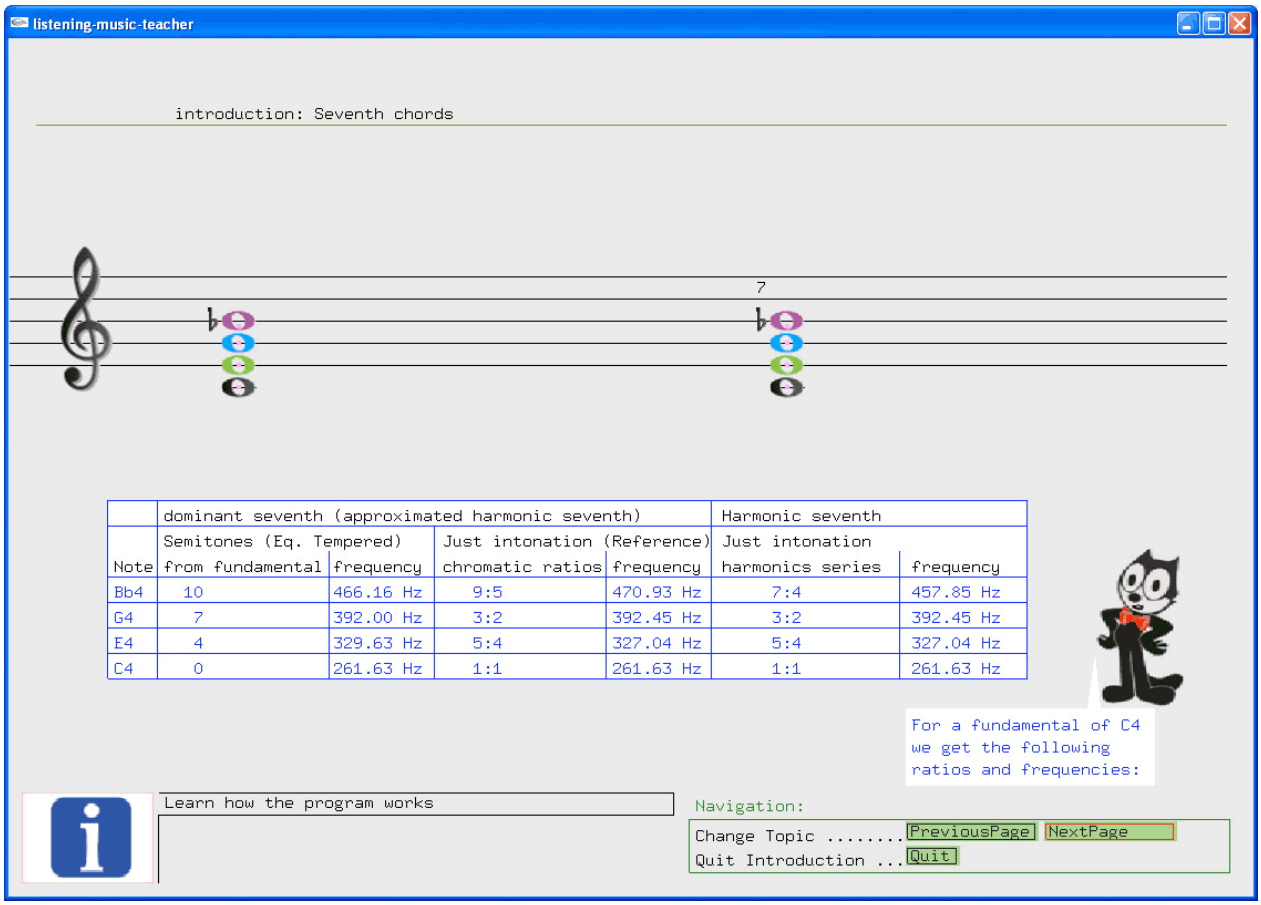
The last entry is not really a seventh chord, since it can be interpreted as an augmented triad with the repetition of the root note.
Another entry was added to the list: the augmented 7^{th}
The augmented 7^{th} deviates from the pattern in that way, that the chord contains a diminished third in its highest interval. A diminished third is a Major second and not really a basic third. In the table it is marked orange.

Since there are now three intervals, we can make three inversions:



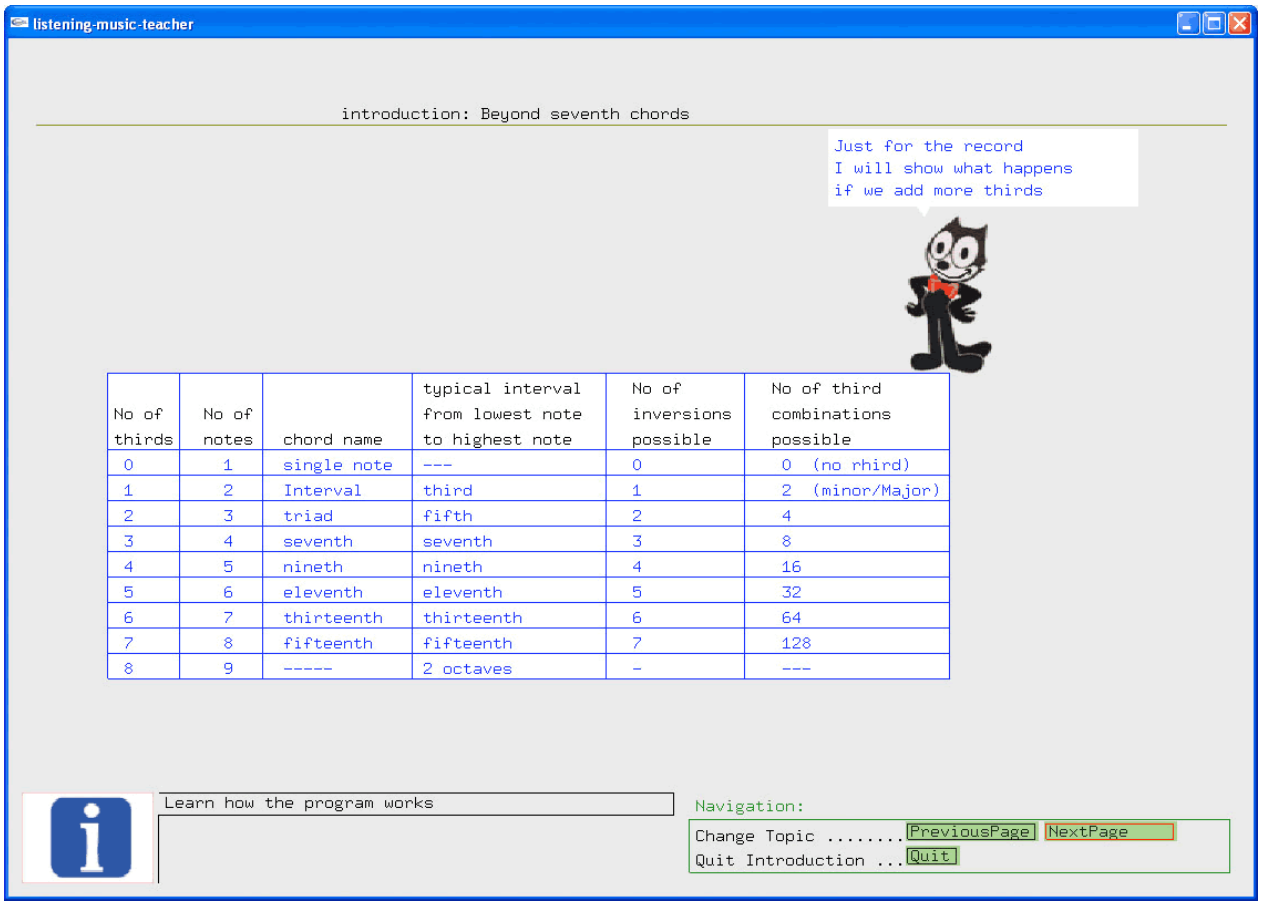
The fourth inversion leads to the root position again.

A somehow special case is the harmonic seventh chord:



The harmonic seventh chord can only be played on instruments, which support the just intonation system. The harmonic seventh interval has a ratio of 7:4. Usually, the harmonic seventh chord is approximated with a dominant seventh chord on instruments, which do not support the just intonation tuning. The program demonstrates the sounds of the two systems.

What happens if we add another third to the seventh chord?

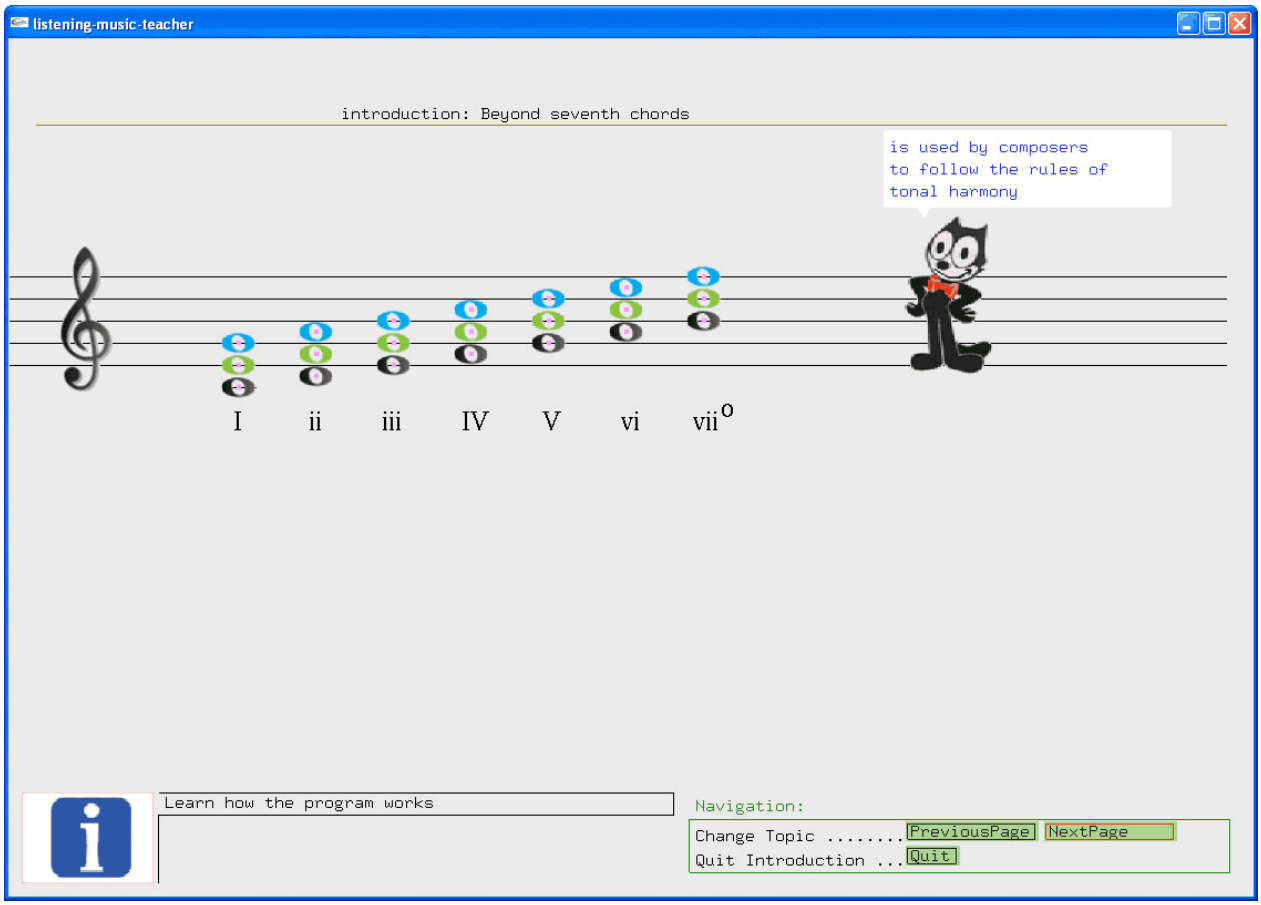


No of thirds	No of notes	chord name	typical interval from lowest note to highest note	No of inversions possible	No of third combinations possible
0	1	single note	---	0	0 (no rhird)
1	2	Interval	third	1	2 (minor/Major)
2	3	triad	fifth	2	4
3	4	seventh	seventh	3	8
4	5	nineth	nineth	4	16
5	6	eleventh	eleventh	5	32
6	7	thirteenth	thirteenth	6	64
7	8	fifteenth	fifteenth	7	128
8	9	-----	2 octaves	-	---

Adding another third will give a typical interval, from the lowest note to the newly added note, of a ninth. Adding more thirds lead to a typical interval of an eleventh, thirteenth, and fifteenth. Adding another third will bring us back to the root note, just two octaves higher.

The interval from the root note to the highest note is usually part of the chord name. For example: a seventh chord. Exceptions to that rule are triads, since the fifth is such an important interval in our musical system, the fifth is assumed by default.

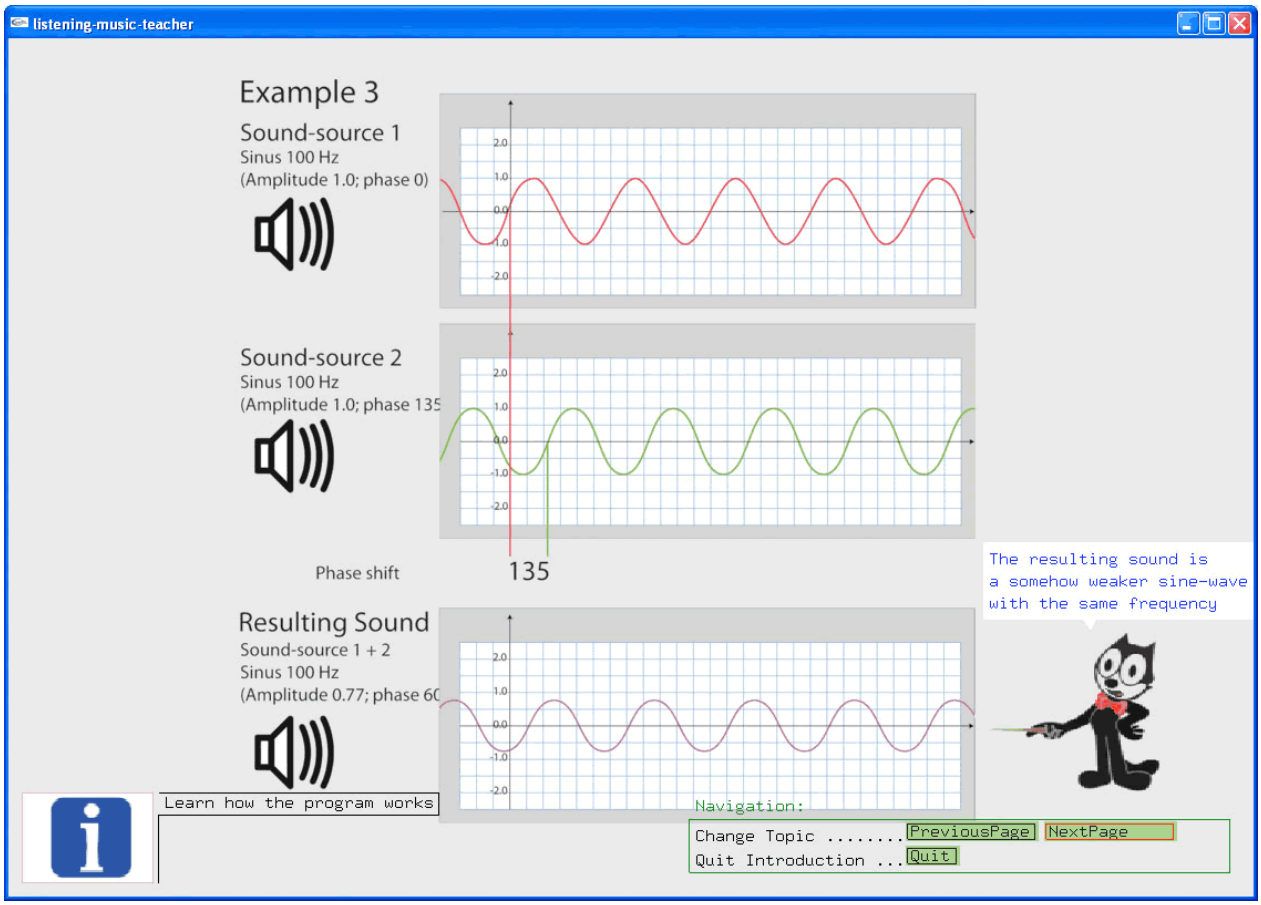
Besides tertian chords, there are other chords, like suspended chords, secundal or quartal chords. Secundal chords consist of seconds instead of thirds, and quartal chords exist of fourth as the name implies.



Composers to follow the rules of tonal harmony use chord progression. In chord progression the chords are given numbers according to the position within a scale. Also the chords in the above pictures look all like Major triads on the first glance, they are not. Only the triads with capital Roman numerals (I, IV and V) are Major triads. All other triads are minor chords. With the exception of the last triad, with is marked with a superscripted 0, which is a diminished triad.

Chord progression is not taught by listening music teacher. Listening Music Teacher concentrates on improving the listening process. Therefore the program goes back to two notes and explains, how we can improve our listening experience by differentiating two notes. Two notes can be differentiated by:

- location
- pitch
- loudness
- instrument (overtones)
- and phase shift



Phase shift needs an absolute point in time. A sound usually starts and stays for some time. The absolute time is not important to determine the pitch or loudness. To explain the phase shift, however, two sound sources have to be in relation to a fixed point in time. If you have a loudspeaker you can observe the going forward and backward of the membrane, as it produces a sound. If you now take two loudspeakers, and the movements of the membranes are synchronized, - or have zero phase shift -, then the sound gets twice as loud. However if the membranes swing with a 180-degree phase shift, the movements of the membranes is opposite. Then the sound from one speaker gets “swallowed” by the other speaker. That is the speakers neutralize each other. That is there is no resulting sound. Any phase shift in between attenuates or amplifies the sound. However, phase shift is not the same as amplification, since for different frequencies the effect of a fixed phase shift is different.

After this rather complicated effect of phase shift, you get the possibility of exploring the first four effects (location, pitch, loudness and instrument) with the “Chord Explorer” in the next lesson.

The Chord Explorer

The chord explorer allows you to identify the name of single notes, intervals, triads and seventh chords by moving the notes around on the screen.
The chord explorer has four notes. By setting the loudness of a note to zero, the note disappears.

From the key signature drop down menu you can choose a key signature. With separate box you can choose if you want to use the minor key instead of the Major key.

For each note you can vary

- the location
- the pitch
- the loudness
- and the instrument

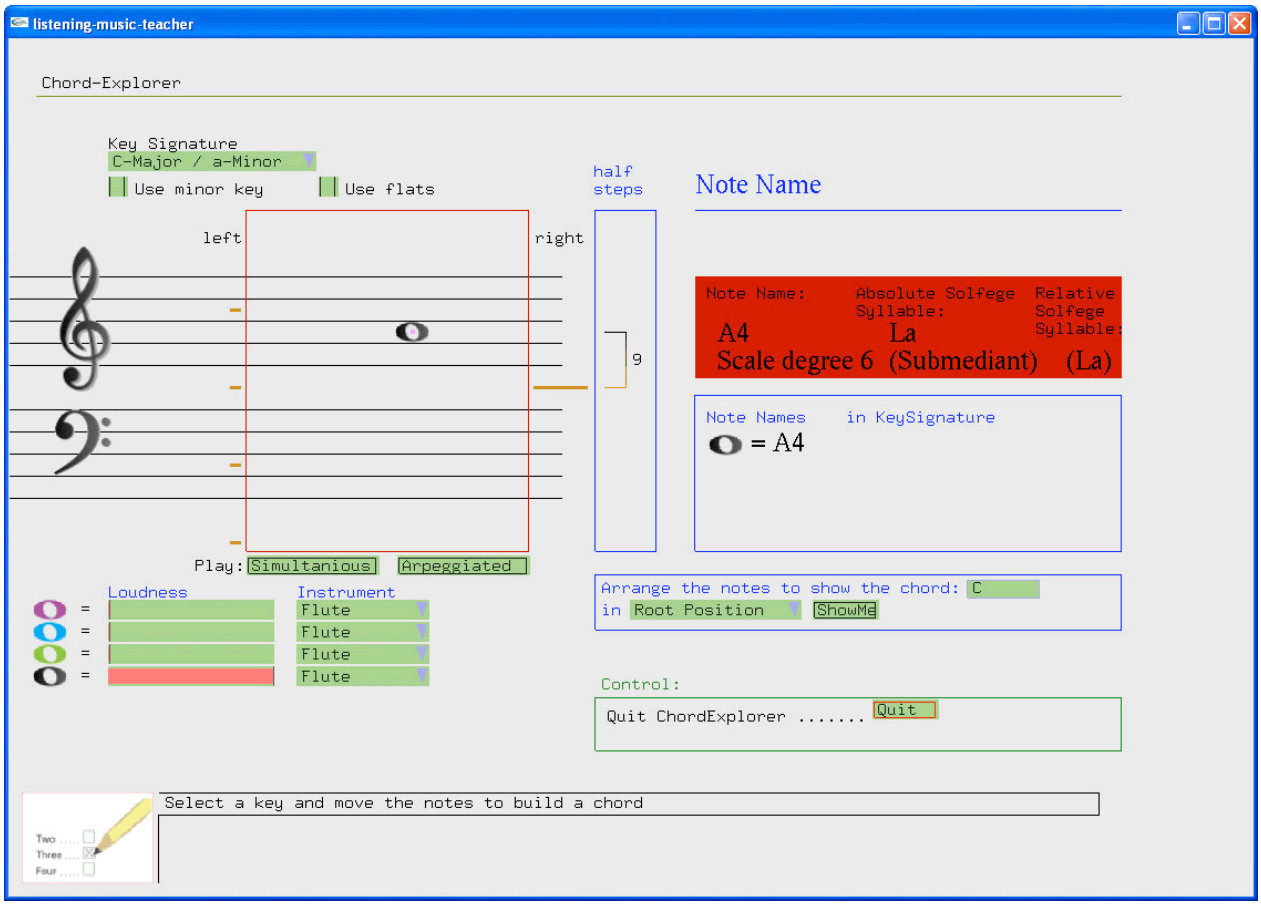
You have a button to play the notes simultaneously, and another button to hear the notes one after the other.

Furthermore you have the possibility to show you triads and seventh chords.

On the area to the right the distance in half-steps between the notes is shown.

To the left the name of the note, interval, triad or seventh chord is displayed.

If you are a beginner, do not let you confuse, that for the same hearing experience there are multiple names in the music language.

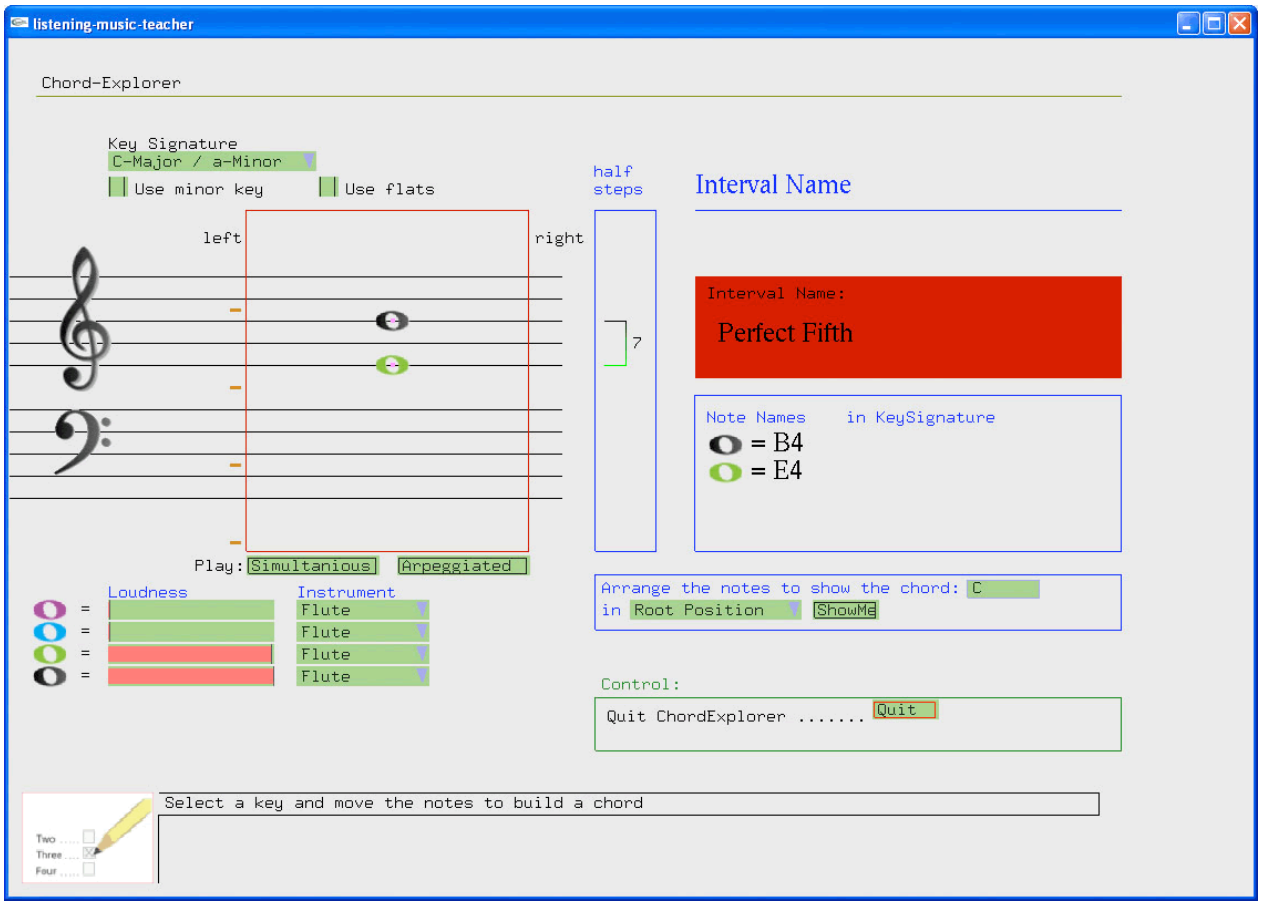


For single notes the following information is given:

- The tonics of the key are marked with small orange lines to the right of the key signature symbol
- You have the possibility to display notes with flats instead of sharps.
- In the column labeled half-steps, the number of semitones from the tonic is given.
- In the display area, you find the note name with the octave.
- The scale degree and if appropriate the function name of the degree is displayed
- The absolute solfege syllable and the relative solfege syllable

A last remark for single notes: If the note is in a space or line, there are three notations possible for the same sound:

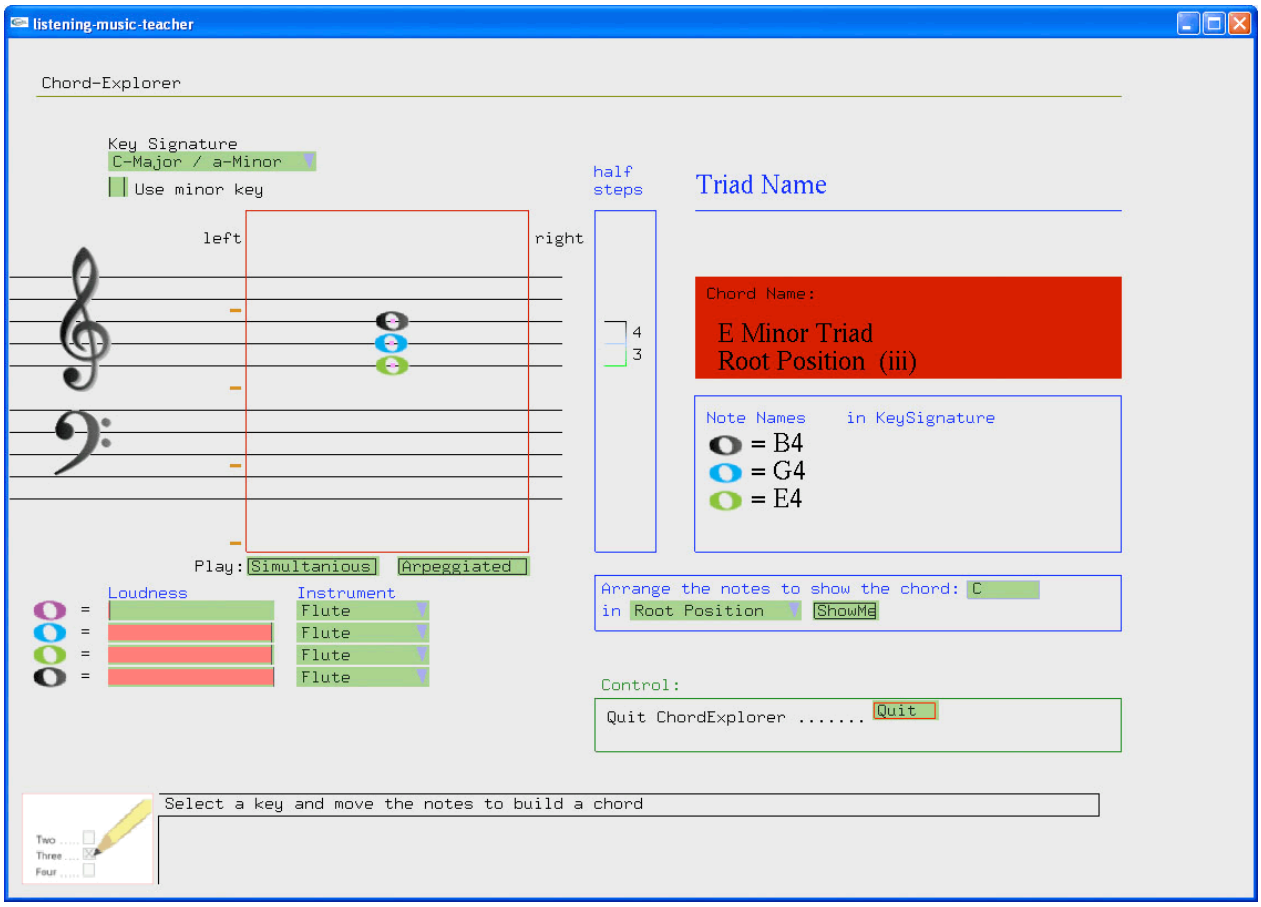
- The note can be displayed with a sharp
- The note can be displayed with a flat
- Or without an accidental if the accidental is in the key signature



For Two notes the following information is given:

- The interval quality
- The interval number
- The number of half-steps between the notes

The rule for interval number says, that you have to count the name changes, independent of the accidentals, and add one. In this way the same interval can sometimes be written in several ways. For example the tone in the middle of a scale is called Tritone. The name Tritone comes from the fact that the distance from the tonic is Three whole Tones (TT). A whole tone has two half-steps and therefore fits three times in the distance of six half-steps. The chromatic interval name for this interval is either a diminished fifth or an augmented fourth, depending on the use of sharps or flats.

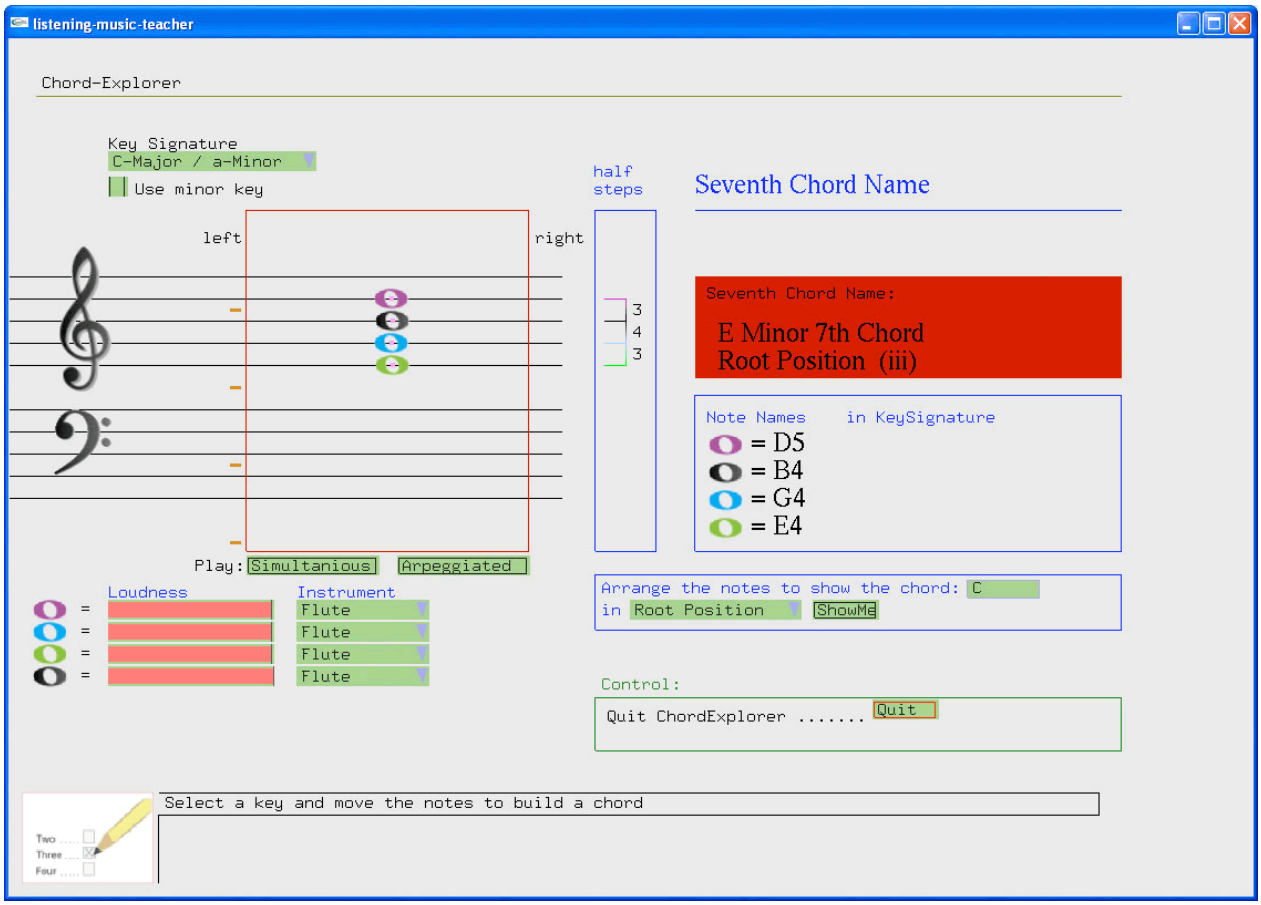


For three notes the following information is given:

- The name of the triad
- The position (Root position, first- or second inversion)
- If the chord is within the key: the chord number with Roman Numbers
- The half-steps between the notes

The root note gives the chord the name before the quality. To get the root name, you have to bring the chord in root position. That is you have to move one or two single notes an octave lower until there are two thirds stacked up. If the chord is in root position, then the lowest note is the root note. Another way to determine the root note is: If there is a fourth in the triad, then the upper note of the fourth is the root note.

Do not let you confuse with tonic and root note. The tonic changes with the key signature. The root note is independent of the key signature; the root note is only dependent of the arrangement of the notes.



For four notes the following information is given:

- The name of the seventh chord
- The position (Root position, first, second or third inversion)
- If the chord is within the key: the chord number with Roman Numbers
- The half-steps between the notes

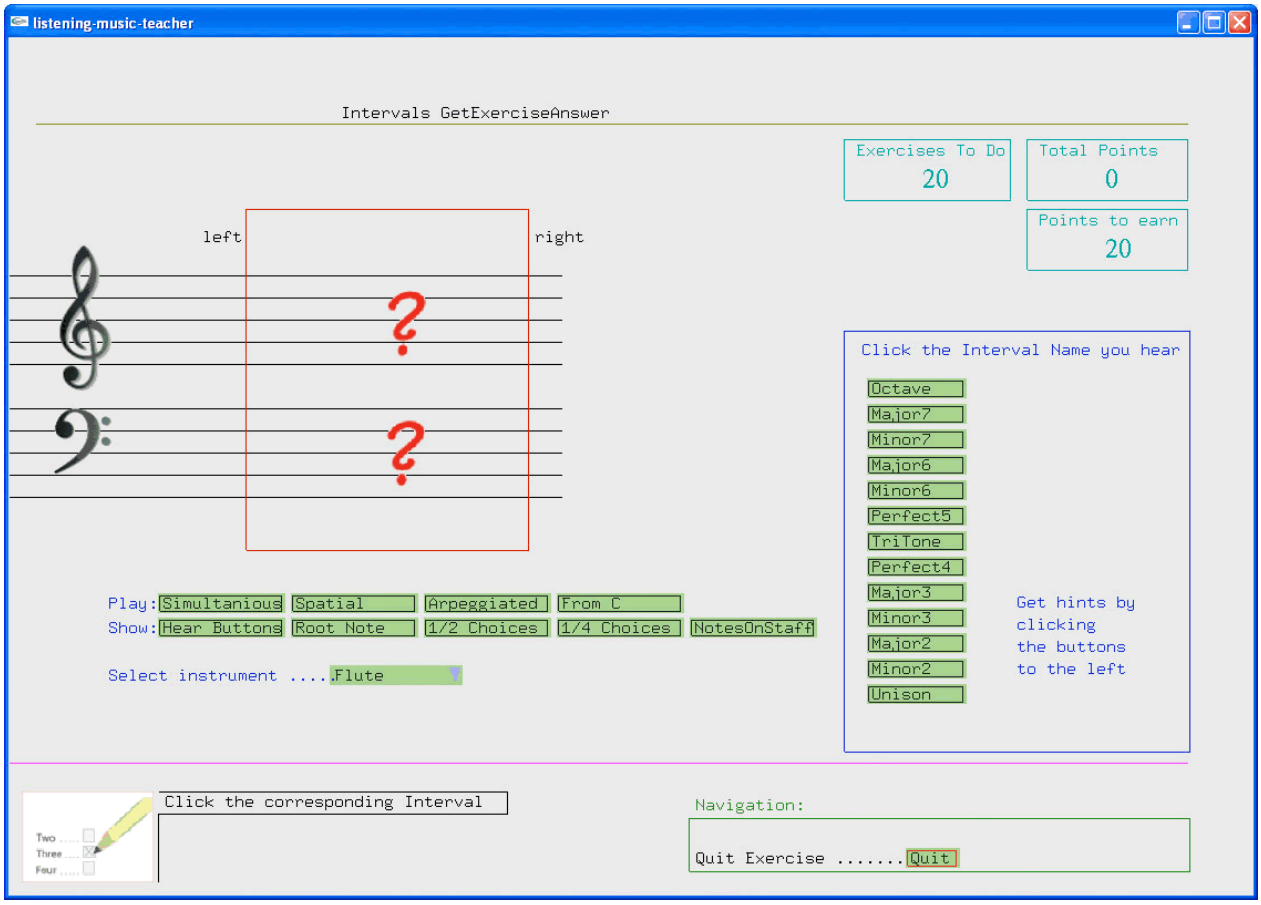
If you want to make a note stand out, lower the volumes of the other notes and choose solfege from the instrument menu for the desired note.

Enjoy the music. Take John Lennon's implied advice in the song Mother: "I couldn't walk and I tried to run": Start slowly, use the C Major scale, which has no sharps or flats, and begin to understand the music better.

The following exercises will help you to improve your listening skills.

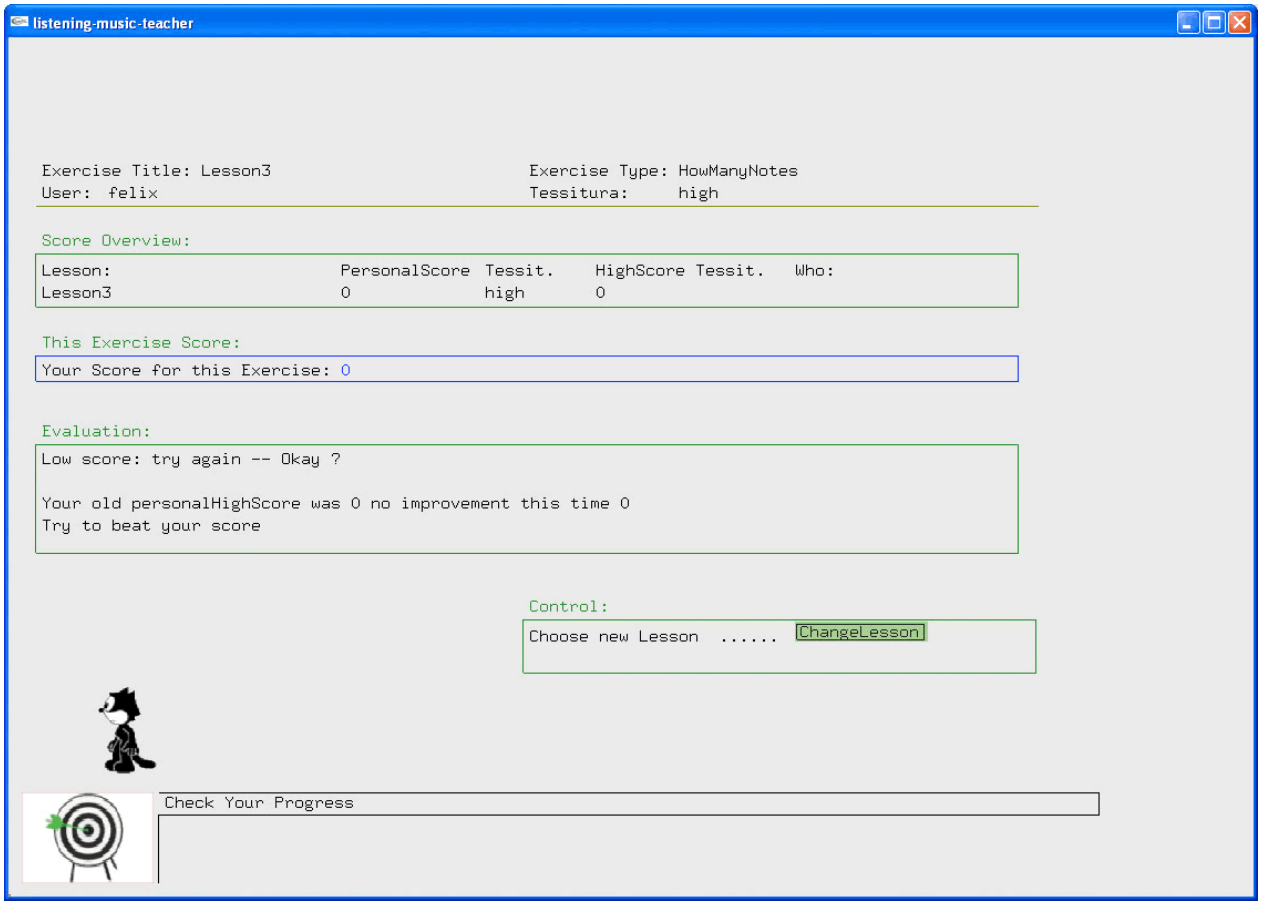
Exercises

Usually the exercises just display question marks, as shown in the sample screen below. Your task is to listen and then give the correct answer. There are usually one or more help buttons, which ease this task. However, using these hints buttons lower the possible number of points you can earn for solving the question correctly. For illustration purposes the screens in the manual show the notes on the staff. After solving a question the answer is also displayed on the screen.



There are a few exercises where you have to sing the answer. The purpose of these exercises is that you learn to hear a single note out of several notes played together. If you can hear the note you have to express that note through your vocal chords. That is like amplifying the sound of a particular note in your head. For example the first of these exercises is to sing the lowest note of a triad that you hear.

Before we start describing the exercises, we show you the common process after finishing an exercise. When you have finished an exercise, you will automatically be transferred to the feedback screen:



In the middle you find the score you reached for a particular exercise. The scores are colored as follows:

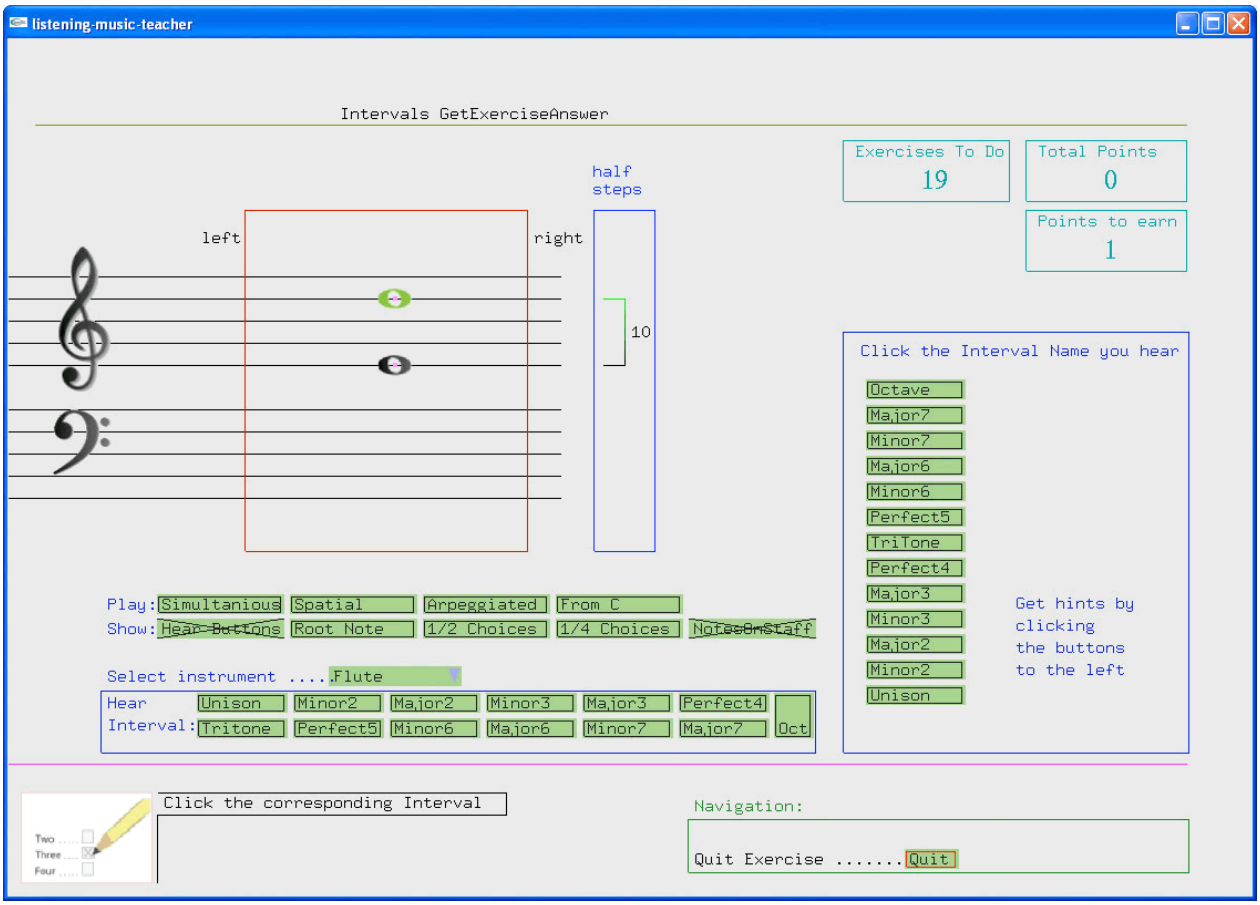
- blue: You reached less than one third of the possible points
- green: You reached the basic level
- yellow: You reached more then two thirds of the possible points
- red: You have more then 90 % correct answers

Below you see your previous high score, and a comment to keep on improving.

The scoring allows you to track your progress. If several users are using the program, the person with the highest score is also listed. Take this challenge as an invitation to get better.

Interval names

In this lesson you have to identify the interval played. This is not an easy task for a beginner. Therefore skip this exercise for a later time. It is not necessary to have this skill to make the other exercises. In the other exercises you will be guided slowly to improve your listening skills. This exercise continues where the program Listening Singing Teacher left off. If you have finished the exercises in Listening Singing Teacher, this exercise should be easy.

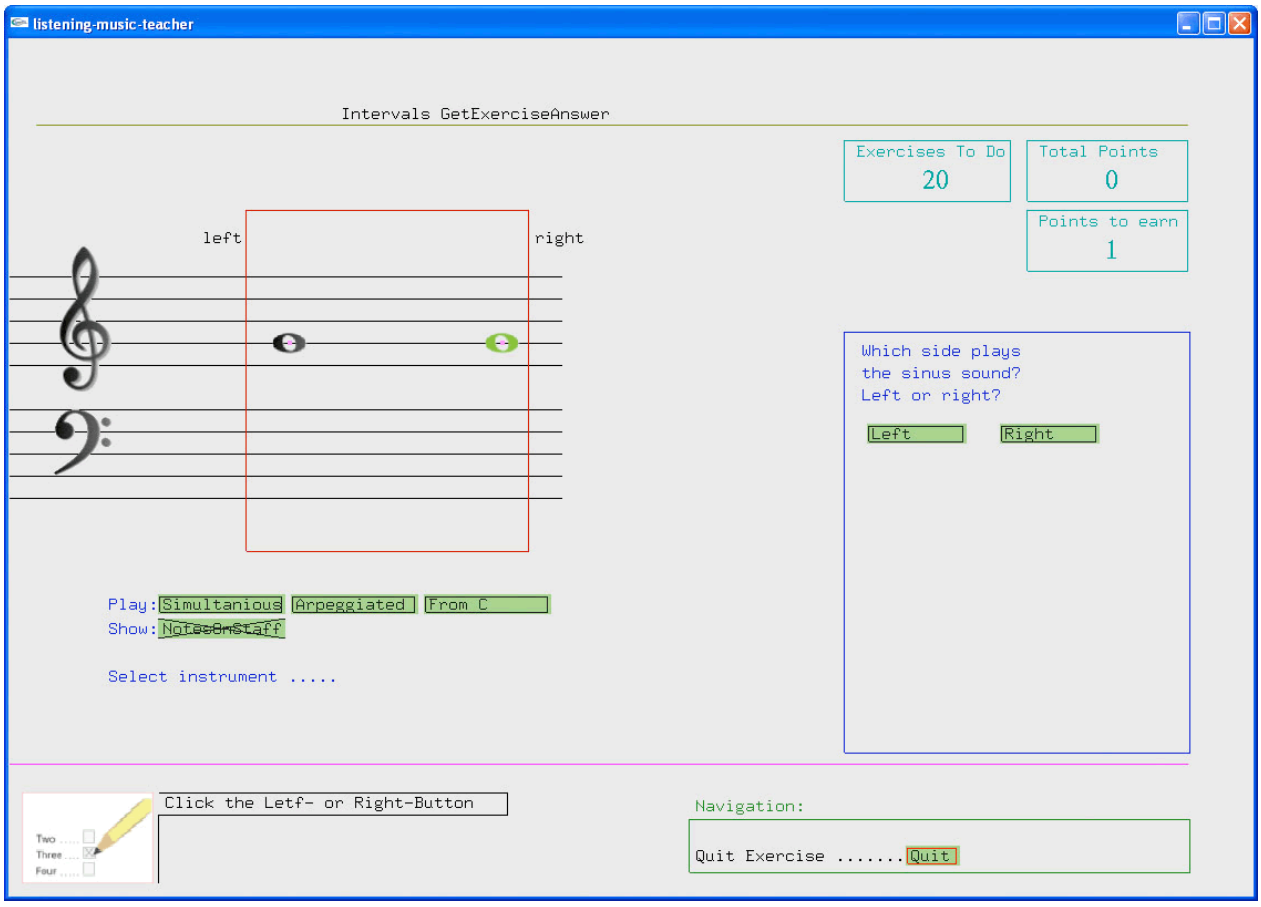


Normally only question marks are displayed on the staff. Here for illustrative purposes the option show “Notes on staff” was chosen. You can hear the interval as many times as you want: Just click play “Simultaneous”. If you click “Spatial” the lower note comes from the left speaker and the higher note comes from the right speaker. Of course using this hint will lower the points you can earn. Other hints are play “Arpeggiated”, which plays the notes one after the other. “From C” moves the lower note of the interval to C. If you click show “Hear Buttons”, a pane with the thirteen possible intervals opens. You can click any interval and you will hear that interval. Now just compare the interval with the interval in question. This is easy and makes the exercise solvable just by listening even for beginners (believe me it is easier than counting the half-steps). If you are still not sure you can remove wrong answers from the possible answer list (“1/2 or 1/4 Choices”). Finally you can display the notes on the staff and solve the question by counting the half-steps. Clicking the right answer button with the last option will still earn you one point.

All exercises are made this way and encourage you to use as little hints as possible to earn as much points as possible.

Left or right?

To be successful in this lesson, you have to focus on your ears: In particular you must concentrate to hear if a particular feature comes from the right or left speaker. To be able to do that, you need two speakers, or even better a stereo headset.



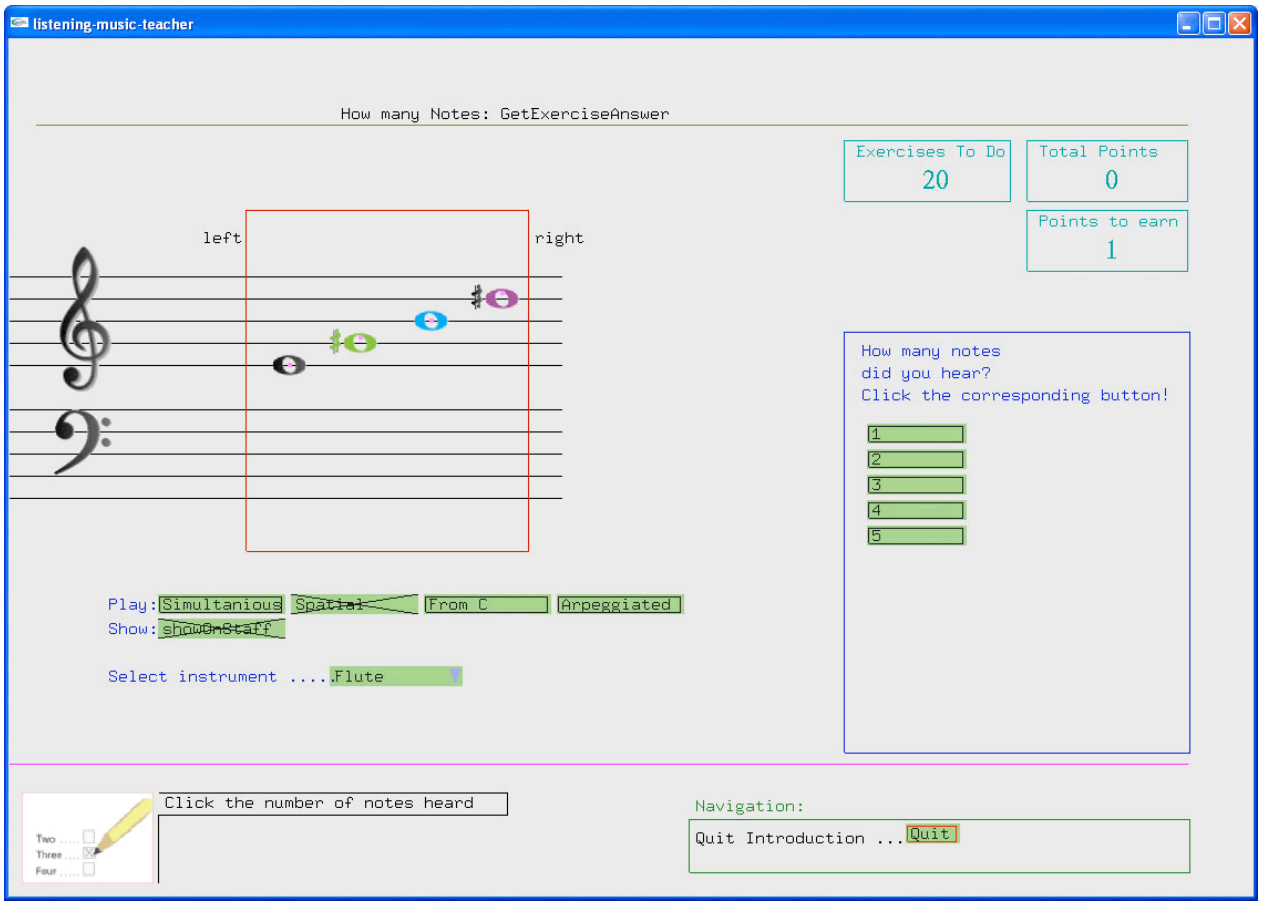
The features you have to listen for are:

- Instrument (does the sine wave come from left or right?)
- Loudness (which sound is louder: the right or the left one?)
- Pitch (is the sound on the right or left higher?)

Even so, you reduce the possible number of points to one, if you click show “Notes on staff”, it is not of any help for the first exercise. Since there is no visual clue on the staff, which note plays which instrument. However for the last two features this button makes it easy for you (softer sounds get displayed in a lighter color). To solve questions of the first type (instrument) it is best to play the sounds arpeggiated (one after the other). However, - as always -, you should try to solve the questions without any hints.

How many notes

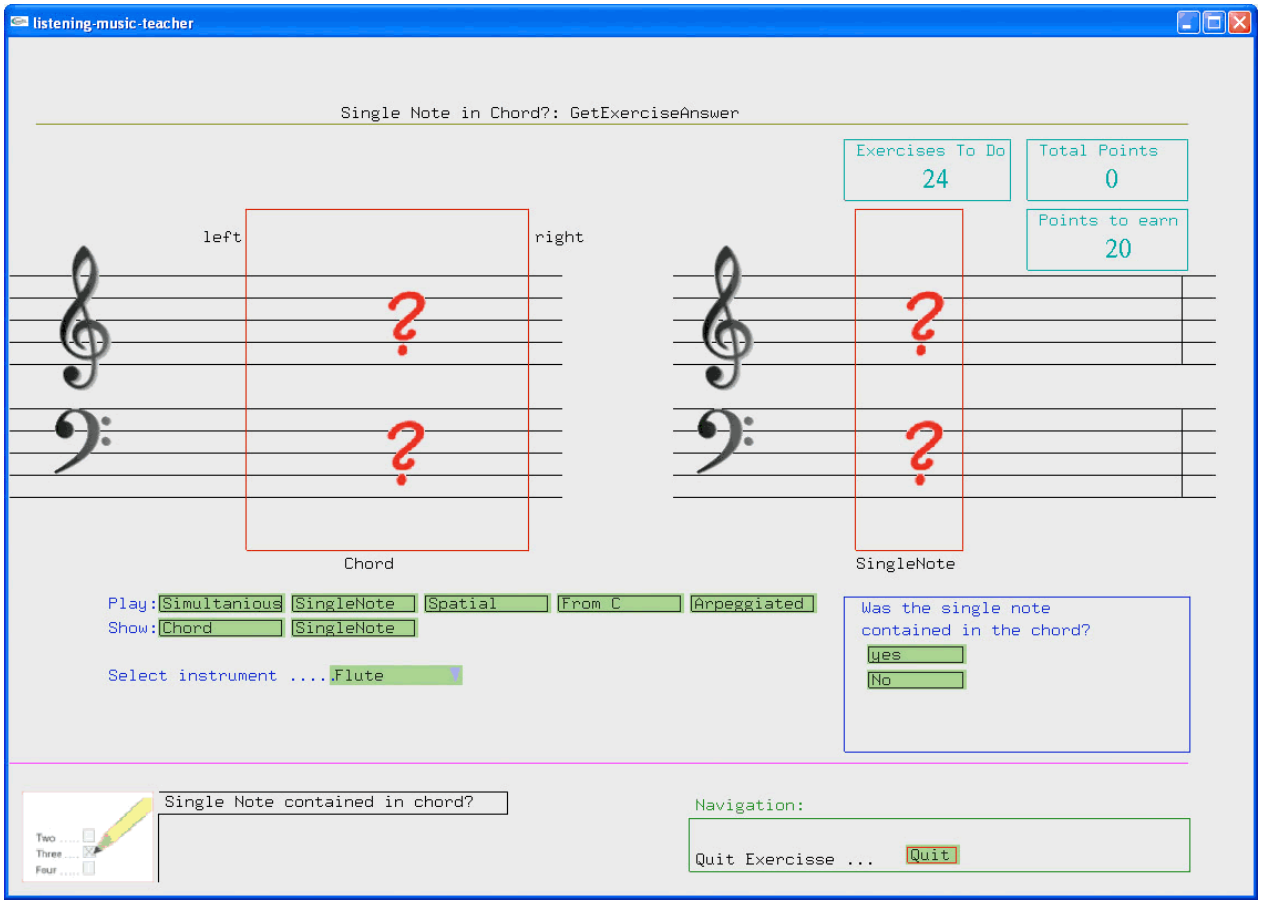
In this exercise you hear a random number of notes played simultaneously. Your task is to find out how many notes were played. In the below sample screen the hint buttons show “Notes on staff” and play “Spatial” were pressed.



Using the button play “Arpeggiated” is like cheating. However, you still have to count the notes correctly. So if you do that right, you will still get more points, than if you take a look on the notes (e. g. click show “Notes on staff”).

Note in chord?

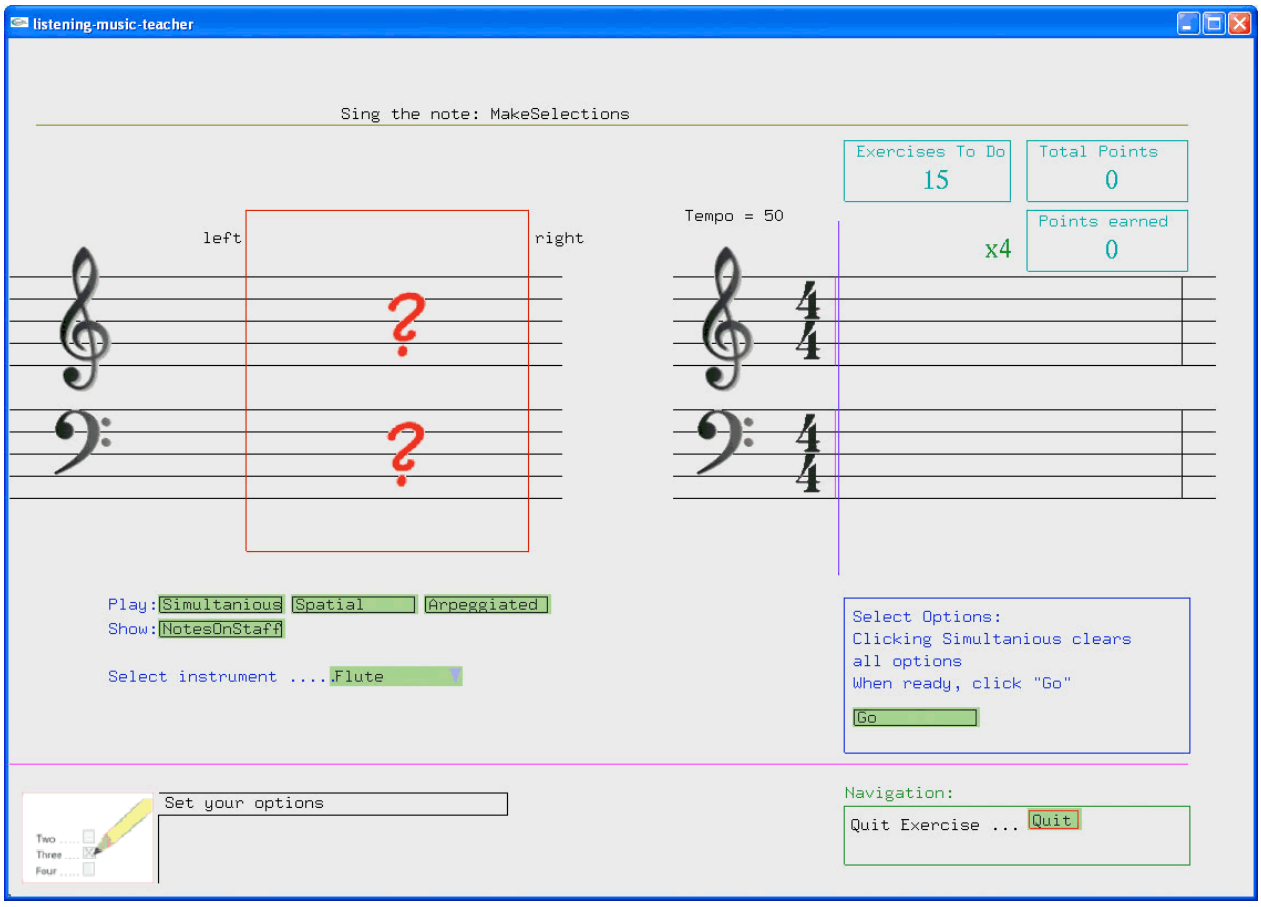
First you will hear a chord played simultaneously. Then a single note is heard. Your task is to determine, if the single note was also played in the chord.



In this exercise you can also press the button play “Single note” as many times as you like, without loosing points to earn.

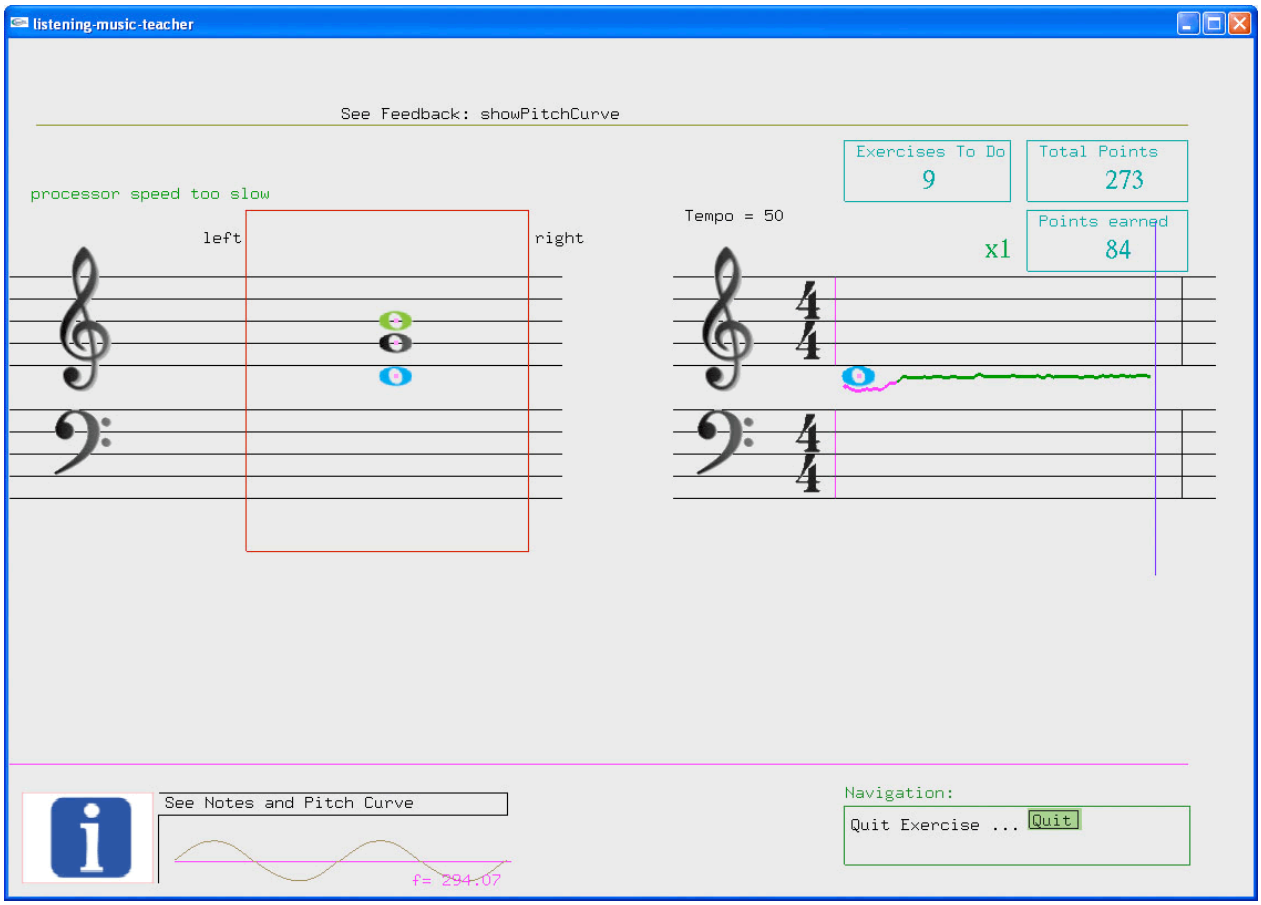
Sing the lowest note

For this exercise you need the microphone. Since the evaluation of the singing is done in real time, you have to set the options before you start the real exercise. Note that in the upper right corner there is a multiplier displayed. By choosing options that make the task easier the factor will get smaller. The evaluation is done on how accurate you sing the note in question back. This exercise helps you to analyze chords.



On the next screen see the exercise in action, after you have pressed “Go”. For demonstration purposes the option show “Notes on staff” was selected.

As with listening singing teacher you get real time feedback on your singing. In this way you can correct your singing during the evaluation.

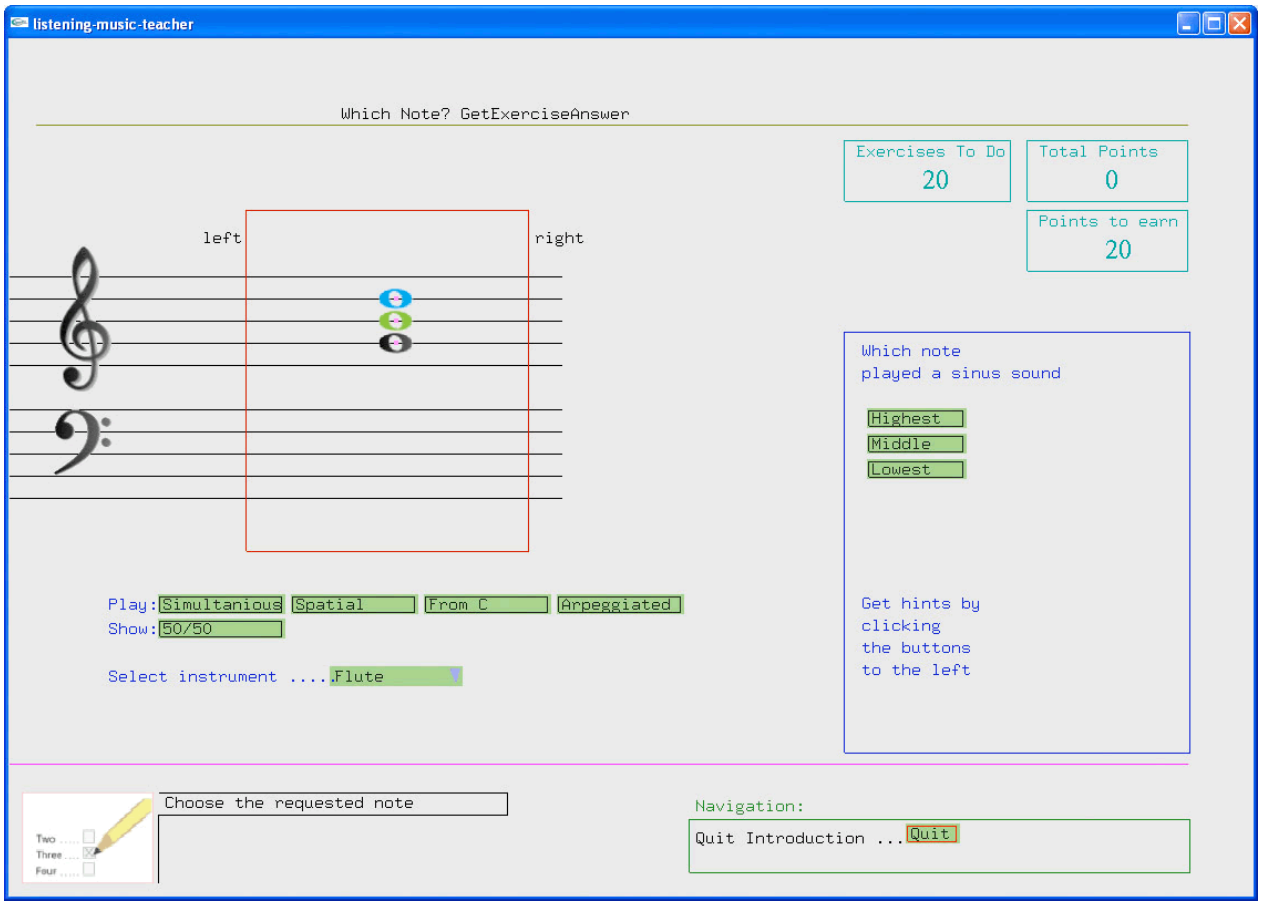


Since you get points from the beginning, you should try to sing the note correctly from the start. This means listening carefully and then preparing the note in your head, so that you are ready when it is your turn. As a tip it is easier if you already start to sing while the chord is still being played. Since you hear a whole chord, you get a feeling for the note in an appropriate context. This develops a sense for our tonal music system.

Which Note?

In this lesson you will have to identify one of three notes you hear. The notes are displayed on the screen. The criteria are:

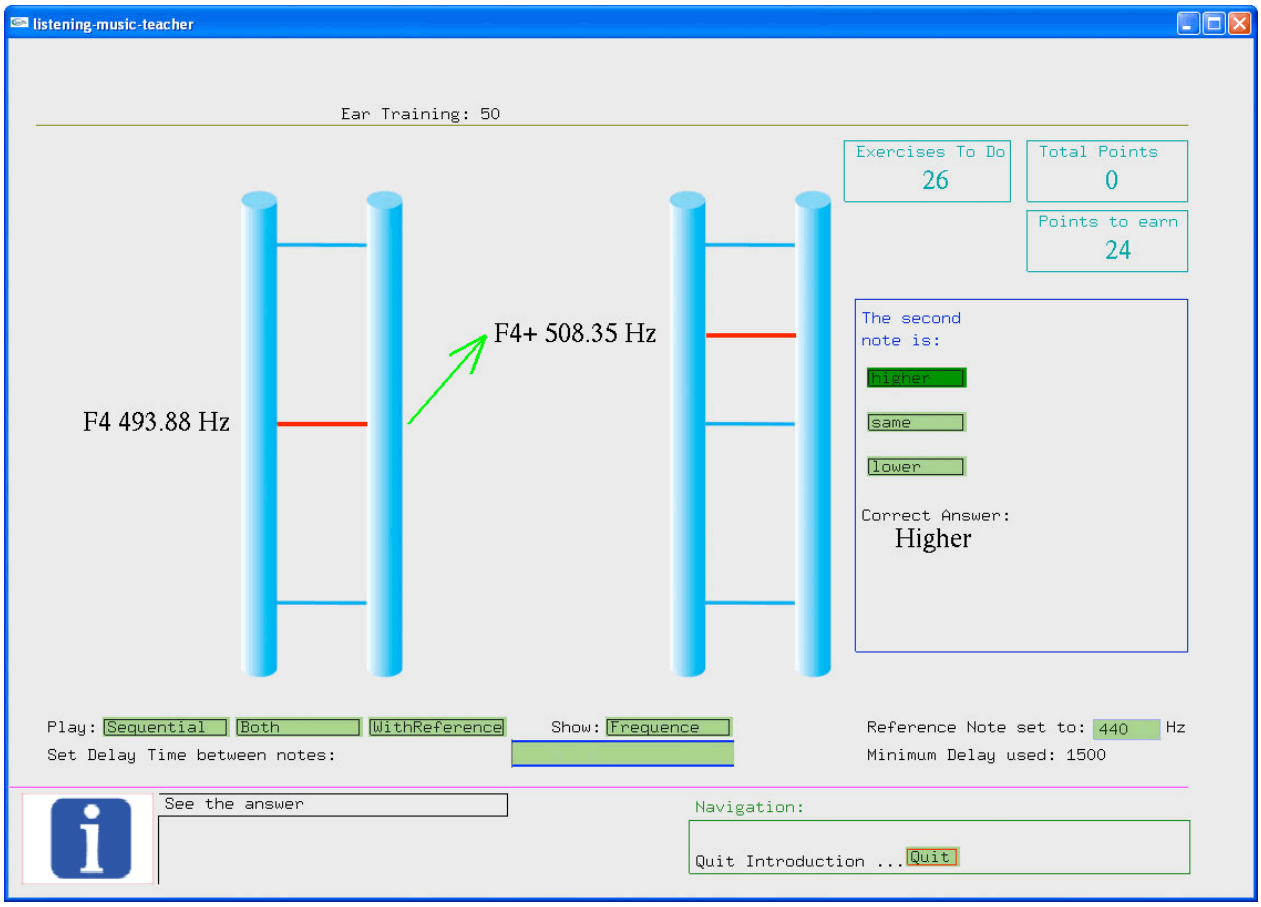
- Which note plays the simple sinus sound?
- Which note plays the loudest sound?
- And, which note plays the softest sound



As an extra simplification, you can dismiss one of the three answers by choosing “50/50”. As before, if you make use of the play “Arpeggiated” button, it should be easy to solve the problem. However, try to solve the problem by listening simultaneously, and just reduce the number of answers. Then concentrate to hear the sounds of only these possible answers. In the beginning it is not easy to filter out one note of three, but after a while your score should get better. Especially when you get used to the sounds of triads, you should find it easier to focus on the notes contained in a triad.

Ear Training 50 Cents

This is the first pitch ear training exercise. By now, you should not have any difficulty to differentiate two notes, which are a half-step apart. That is by definition 100 cents. In this exercise you must differentiate sounds which are only 50 cents apart, that is half a half-step. (Answer screen with frequencies and step shown)



The process is always the same: You listen to the first note (randomly chosen) and try to keep that note in your inner ear. After a certain time you hear a second sound. Your task is to tell if the second sound was lower, higher or the same.

The program allows you to make the time shorter between the sounds, so it gets easier to remember the first sound. You can also hear both sounds simultaneously. If you then can hear a variation of the loudness, then the sounds are not the same. By adjusting the reference sound so, that it is near to the notes in question; you can easily determine which note is higher or lower. If you press the button play “With Reference”: You will hear that the change of the loudness of the overlapping frequencies gets lower as the frequency comes closer to the note played. That is if you change the reference frequency up, and the hauling gets faster, then your reference frequency must be higher than the frequency of the note played in parallel: Since, the nearer your frequencies are, the lower the hauling frequency will be (zero in case of a perfect match).

Sing the highest note

This exercise is similar to: Sing the lowest note.
However, it is a little bit more difficult, since all the notes have overtones (even if you play a pure sinus, the loudspeaker will add overtones). In this way it could be that you pick up another sound instead of the one we are looking for. However, since the overtones are weaker, you will fast find out how to recognize the highest note.

Ear Training 33 cents

In this exercise you have to differentiate sounds, which are 1/3 apart from a half-step.

Sing the middle note

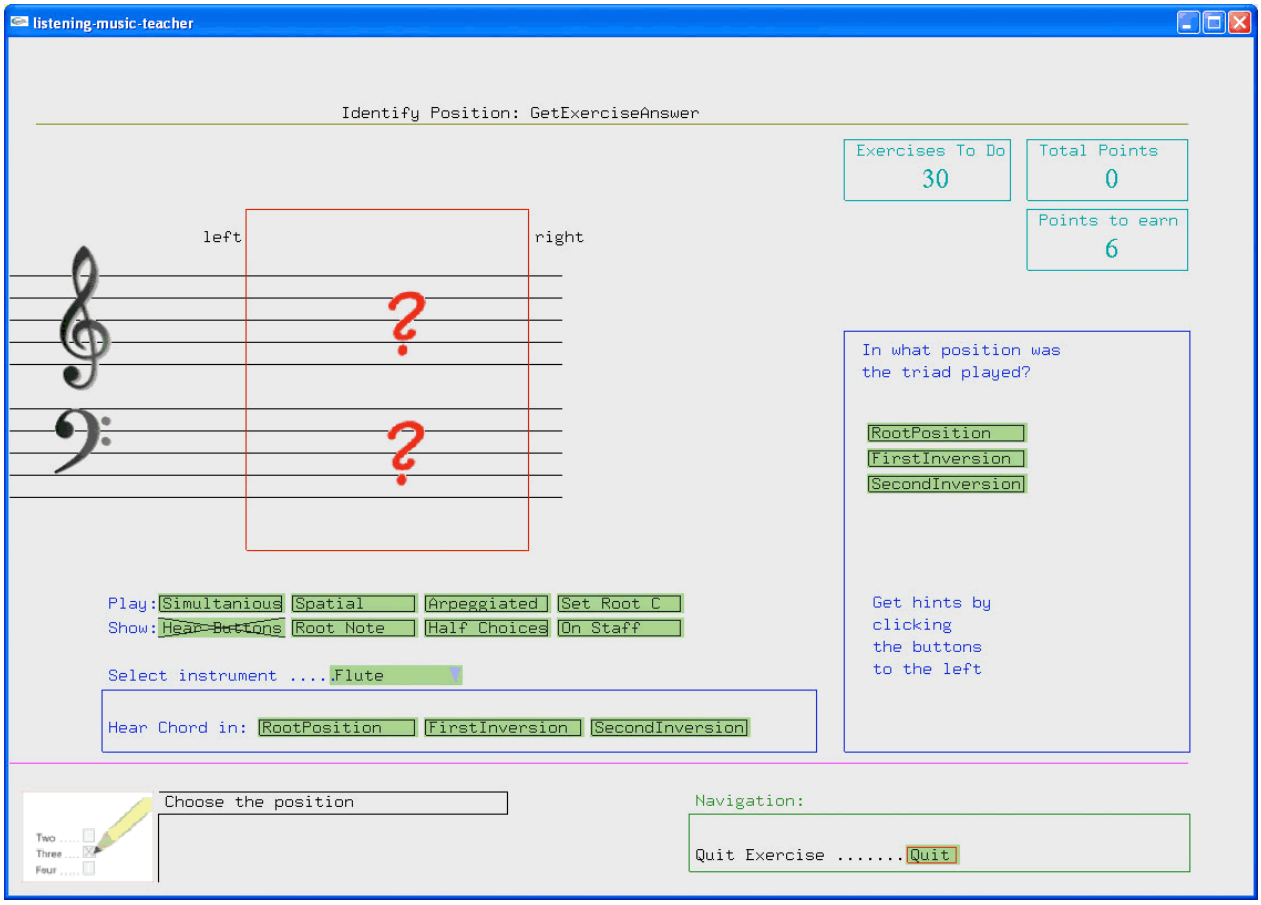
To filer out the middle note of a triad is a little trickier, than to hear the lowest or highest note. You can identify the lowest and highest note and then concentrate on the sound, which is also around. That is you should keep the lowest and highest note in your inner ear, and then try to pick up the sound, which you hear in addition to the two notes. Amplify your analysis by singing the note.

Ear Training 25 cents

The fine mechanics of the vocal chords allow people usually to sing within 25 cents without greater training. In Kindergarten, most children will have no difficulties to sing along with the teacher in that range. However, if you did not practicing singing after school, you might find it difficult in the beginning. Even so it is an ear training exercise, try to hum and keep the first note in your mind. It greatly helps you in the recognition process.

Identify triad position

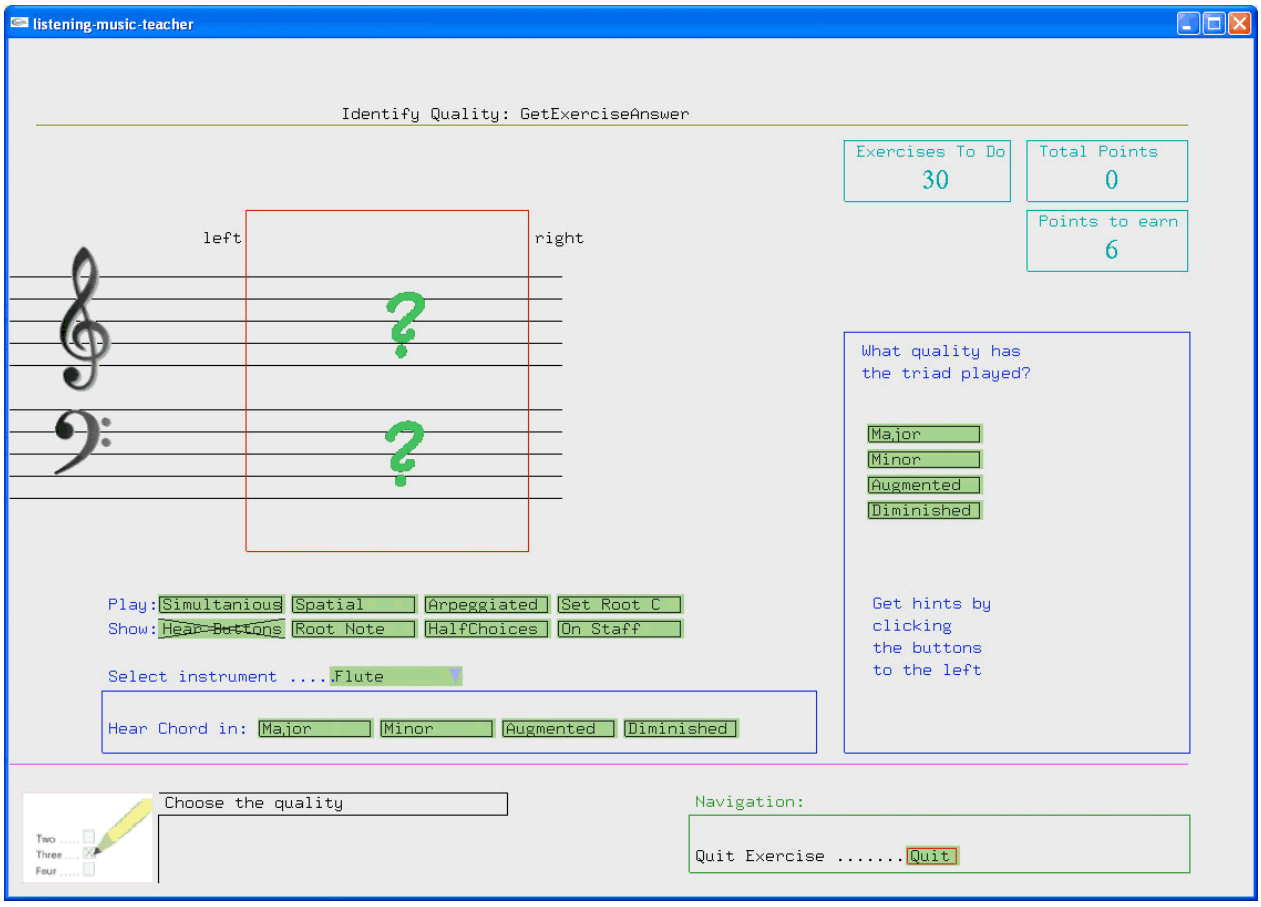
To recognize a triad's position is very easy, since the frequency range goes up with each inversion.



In the beginning just click show "Hear buttons" and listen to the possible inversions. Since a triad has only three positions, and the positions move the frequency range up, the task should be soon a no-brainer. Then you are ready for the more challenging way: Just listen once.

Identify the quality

There are four qualities, and the sound patterns are closer together than with inversions. This makes the task a little bit more difficult, but it should not take too long to get a feeling for the qualities.



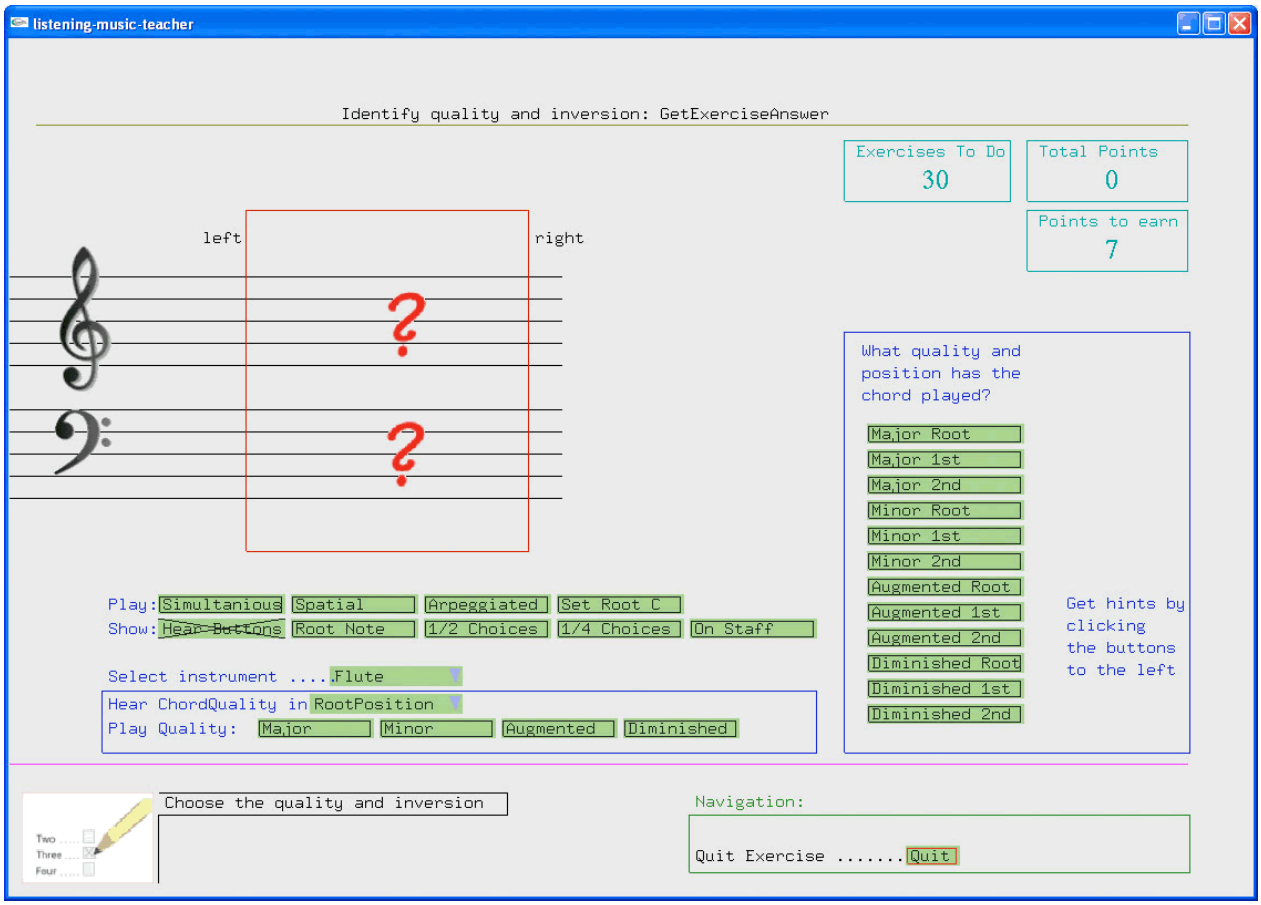
In the beginning you can even reduce the number of possible answers to two ("Half Choices"). After a while you should score better and better.

Ear Training 20 cents

It does not seem a great difference between 25 and 20 cents. However, this is already very challenging for the voice. To control the fine mechanics of your vocal chords in that range needs some training. However, to be able to sing to this precision helps also a lot in the listening process.

Identify triad quality and position

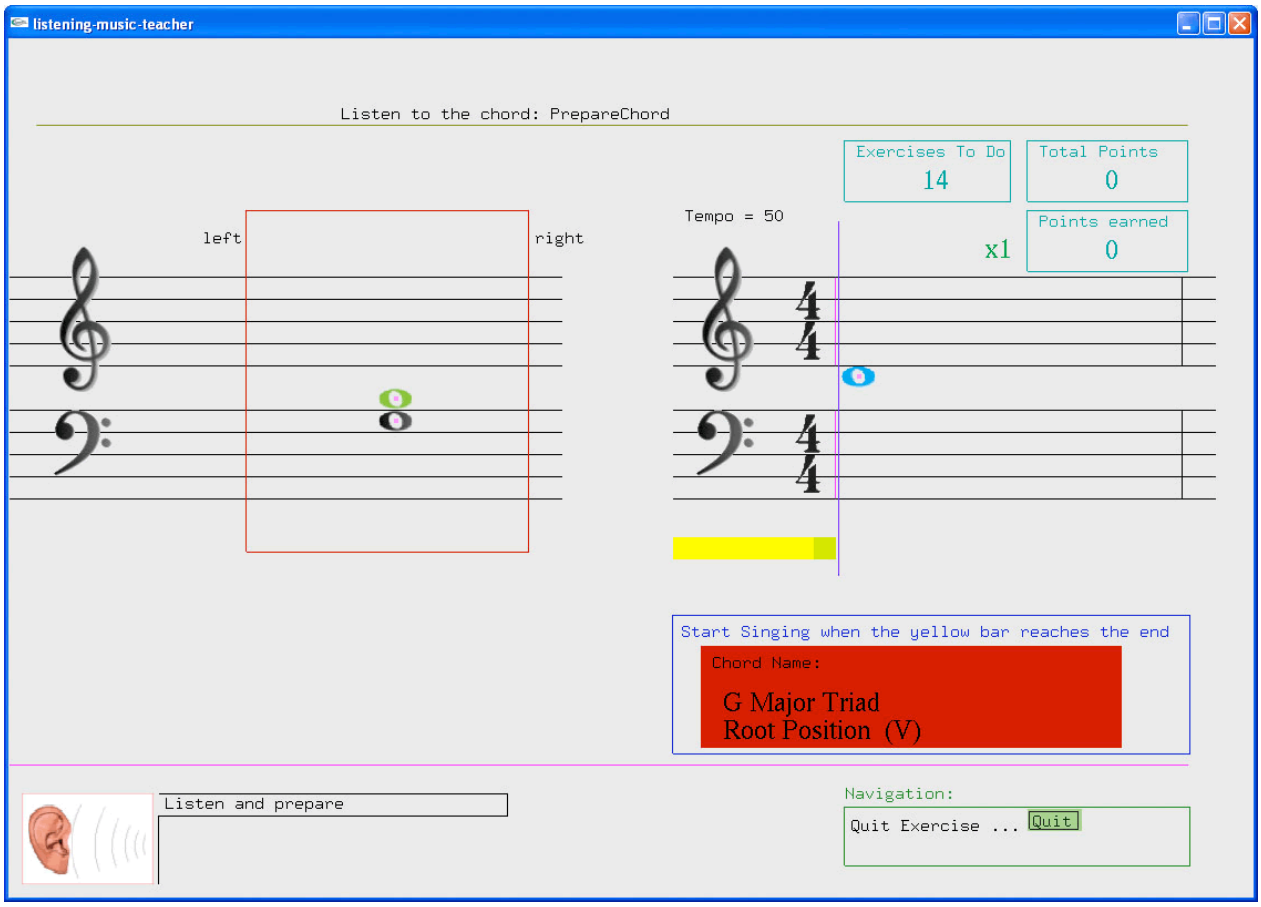
In this exercise you have to choose between 12 possibilities. You will see that some combinations will be easier for you to recognize than others. Try to add more combinations to your repertoire of securely recognizable triads. Start by listening and when you are not sure, use the buttons to make the number of choices smaller.



Try to hear the sound of a combination with your inner ear, then click the button to hear the sound of the triad in question again and compare it with the sound you have in your inner ear. The key to success is: Imagine the sound with your inner ear, and then listen to the sound. If the imagination was not correct, use the show hear buttons, to find out what sound you had imagined and try to associate the sound to the correct combination. If you get stuck, go back to two notes (the interval exercise). Going back helps you to gain confidence, knowing that you can master simpler combinations helps you in building up a solid base.

Sing the missing note

This exercise helps you to go from a chord name to a real sound.



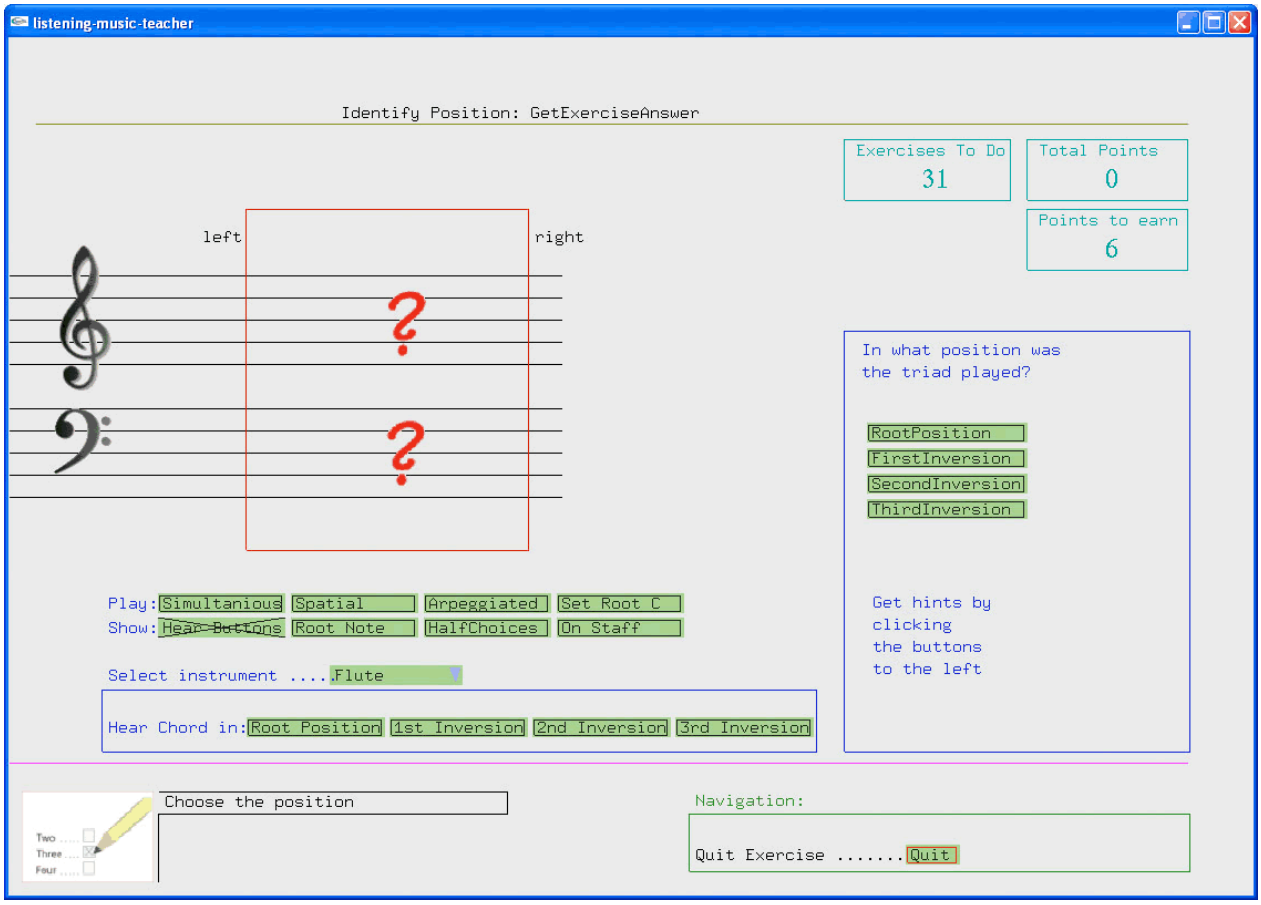
If you want to make all the points, you have to translate the written displayed chord name to the individual sounds. Then you must find the note, which is missing from the chord when the triad (only two notes are played) is played. If you can do that, you have to imagine the missing note with your inner ear and then you should sing that note as precise as you can.

Ear Training 16 cents

Yet, another ear training session. However, since the voice has difficulties to produce sounds within such a small band, you must rely more on the ear. Since ear training is a very important part for all musicians, we decided to make several separate sessions with different difficulty levels. In this way you can build on success and grow your differentiation skills.

Identify seventh chord position

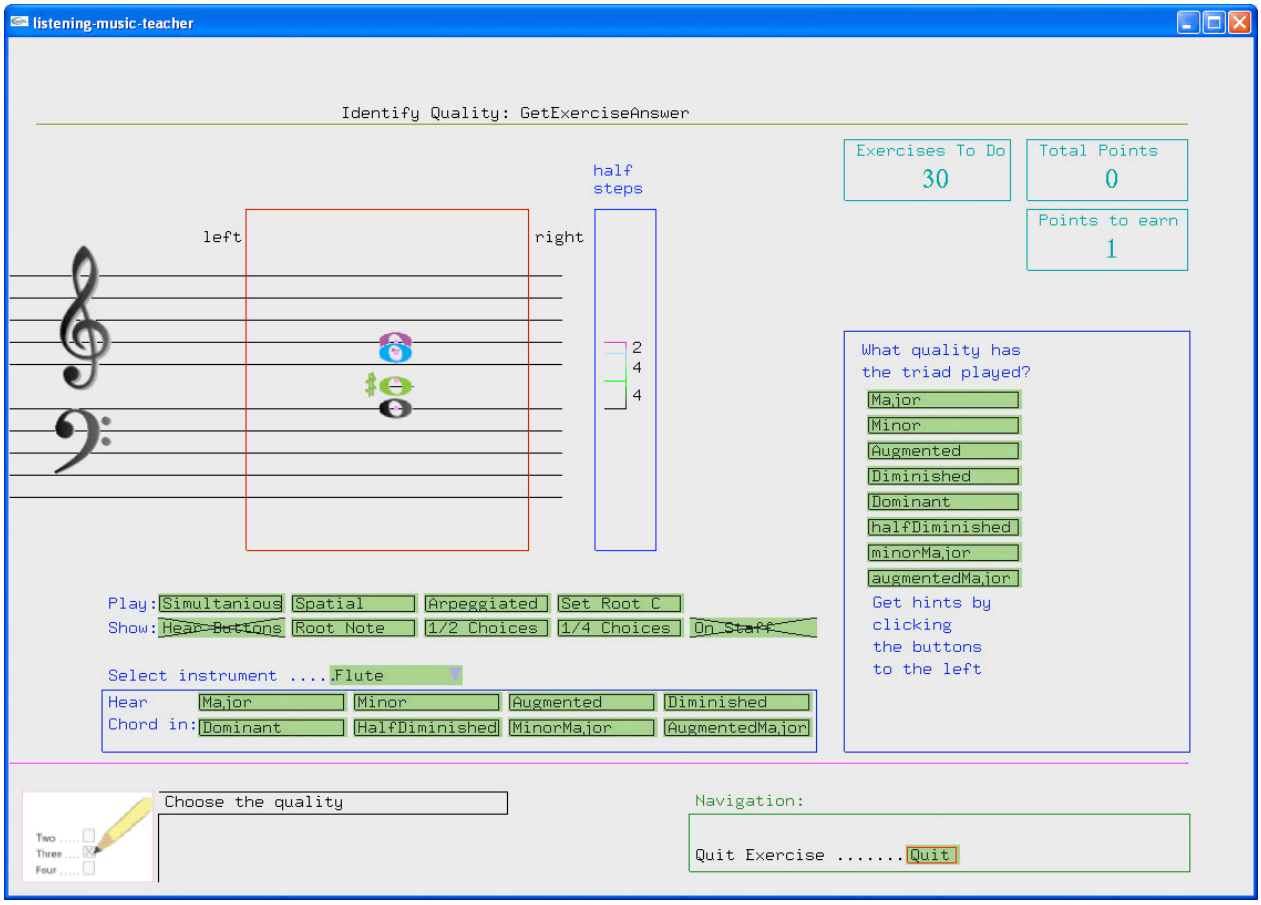
With four notes the difficulty level raises. Therefore we start simple again: With easy to distinguishable inversions.



There are now four positions (root position, first-, second- and third-inversion). Also notice that an inversion does not produce a perfect fourth, since the gap between the highest note and the octave in root position is only a second.

Identify seventh chord qualities

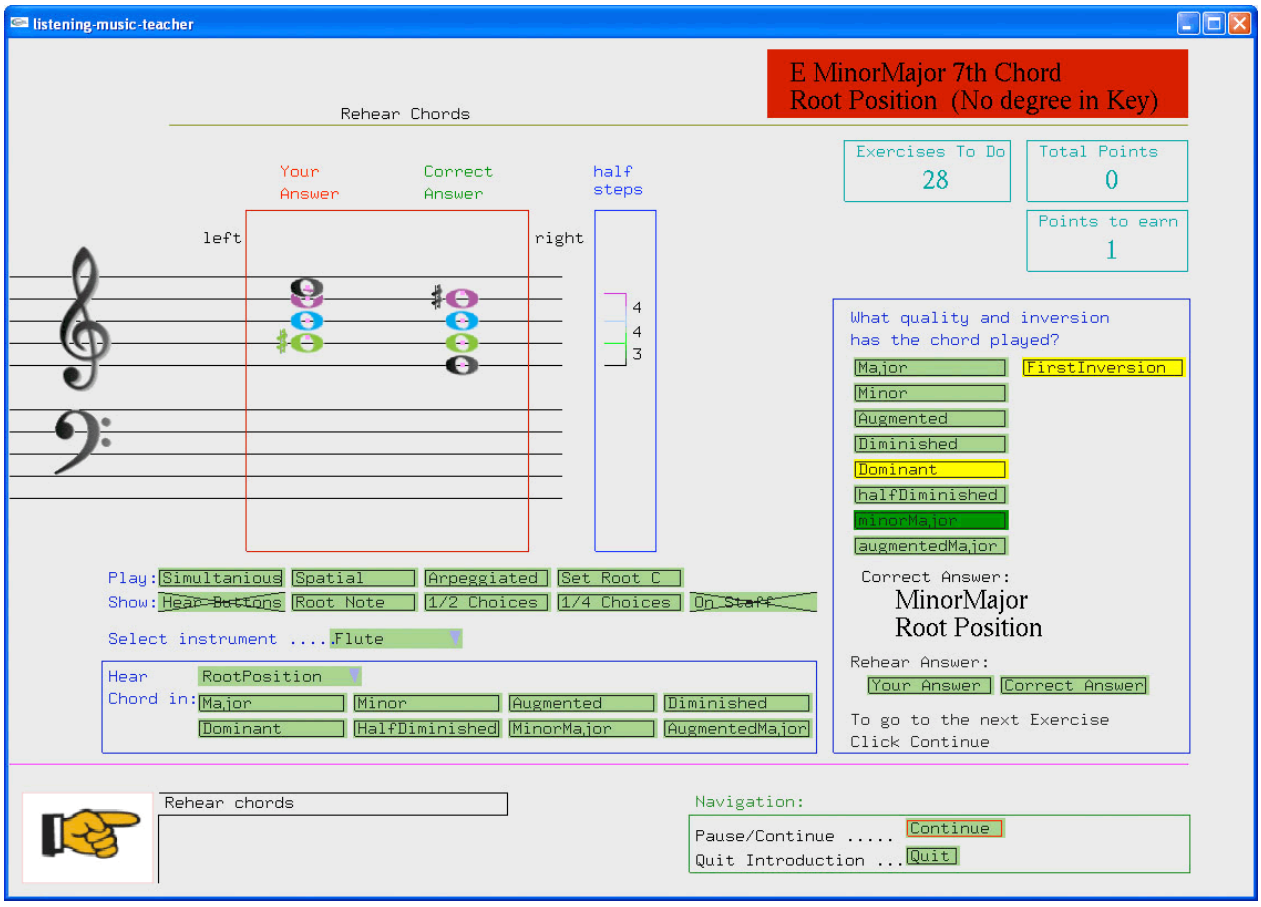
Seventh chord qualities are more difficult to distinguish than triad qualities, since there are now 8 qualities (including a non tertian chord).



However, remember you were able to learn it for triads! You will master the seventh chords too! Notice that clicking show “On Staff” will also display the number of half-steps between the notes.

Identify seventh chord (Quality and Inversion)

To identify the quality and position of a seventh chord is a challenging task. However, there are no new skills required, the same principles as for triads apply.
(Answer screen shown)



If necessary, make a short repetition of the triads and refresh the methods used in the recognition process of triads.

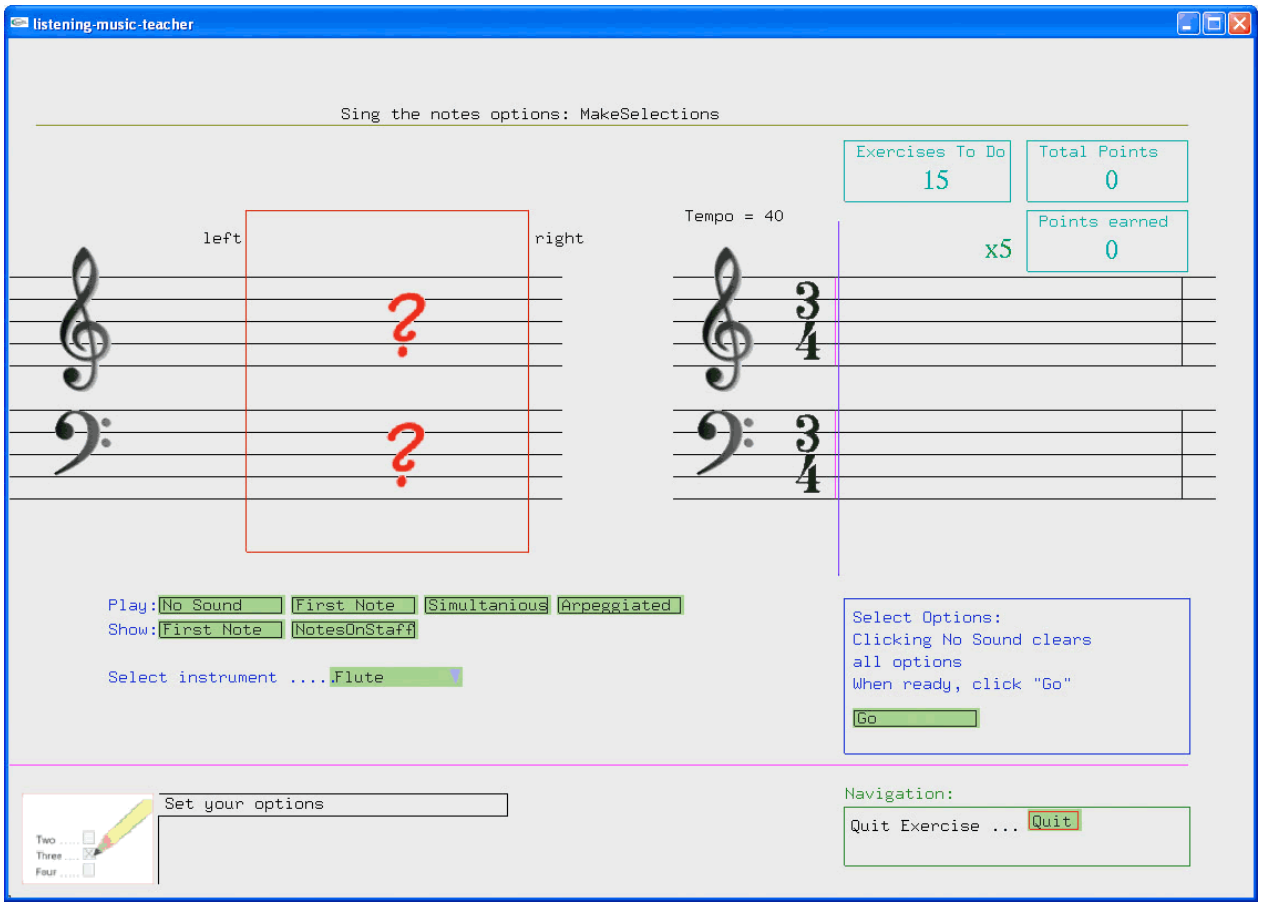
Note that during the display of the answer, the chord name is displayed in the upper right corner. Your answers are marked yellow. The correct answer is marked green. In addition, you get the possibility to rehear your answer as well as the correct answer. You can also choose, - for comparison reasons -, to hear any quality and inversion in the lower left area (titled “Hear chord in”). If you choose this option, you must continue by clicking the continue button in the Navigation area. Otherwise the program continues after about one second with the next question.

Sing the missing note (seventh chord)

This exercise is the same as for triads, but now three notes are played and you have to sing the missing fourth note.
The process to complete the task is more complex, since there are now two “middle” notes.

Arpeggiate chord

This exercise will give you a good feeling of the Western music system.



By arpeggiating chords, you go through the most basic elements of our music system. Since chords will sound familiar, they will sound good. And the underlying physical laws for harmonies will make you feel happy.

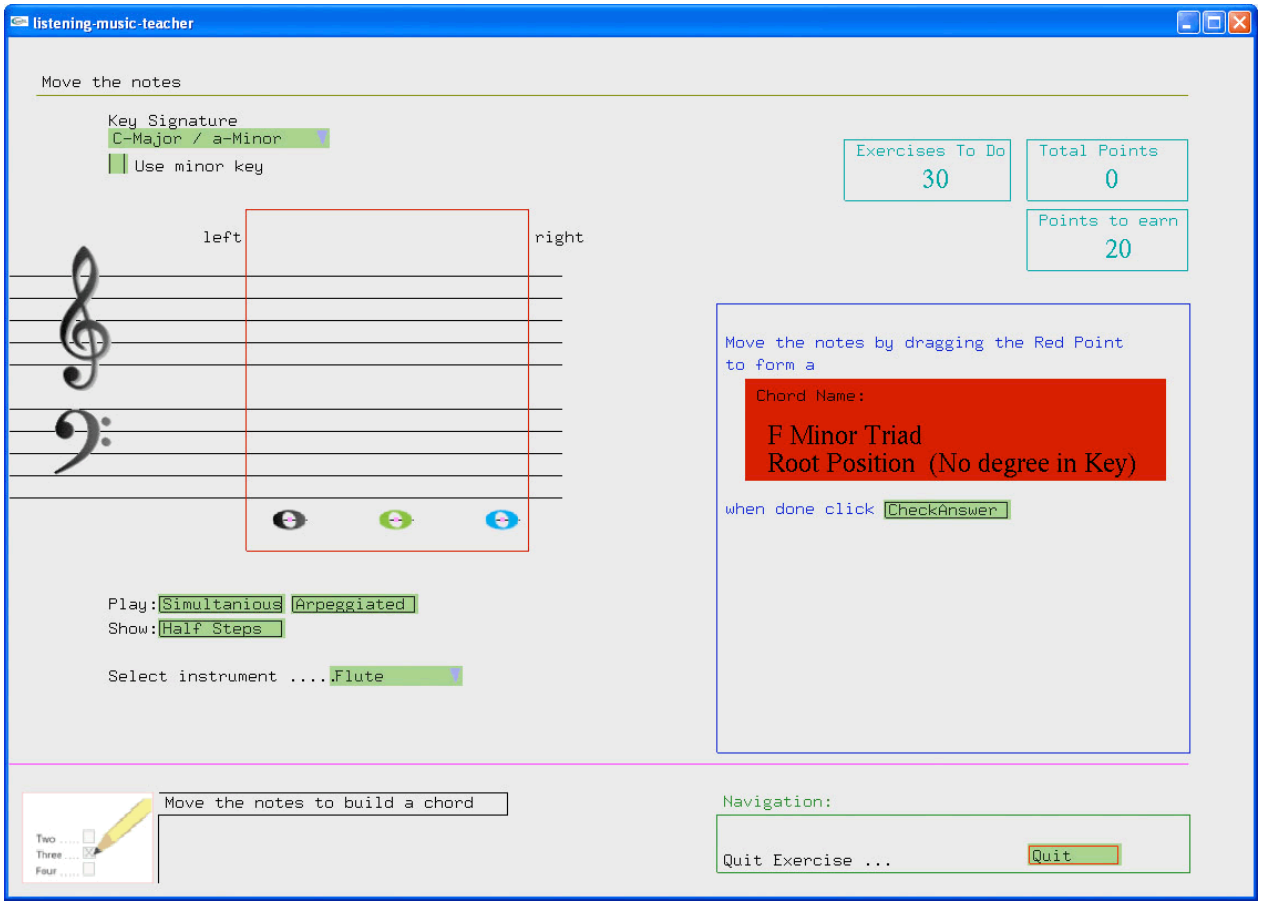
Notice that you can only make the maximum points if you have absolute pitch. When you press “Go” you will be presented the chord and the root note of the chord to arpeggiate. But no sound will be played. Therefore, do not hesitate to click play “First Note”. The idea of the program is to help you learn the concepts of our music system and not perfect pitch. However, if you feel comfortable after a few exercises with the first note turned on, - that is you feel that you got the sound system in your head -, you can try to do the exercise without any hints.

Ear Training 12 cents

This ear training session is in the range of musical instruments. Most people have difficulties to distinguish differences that are smaller than 10 cents.

Move the notes into place

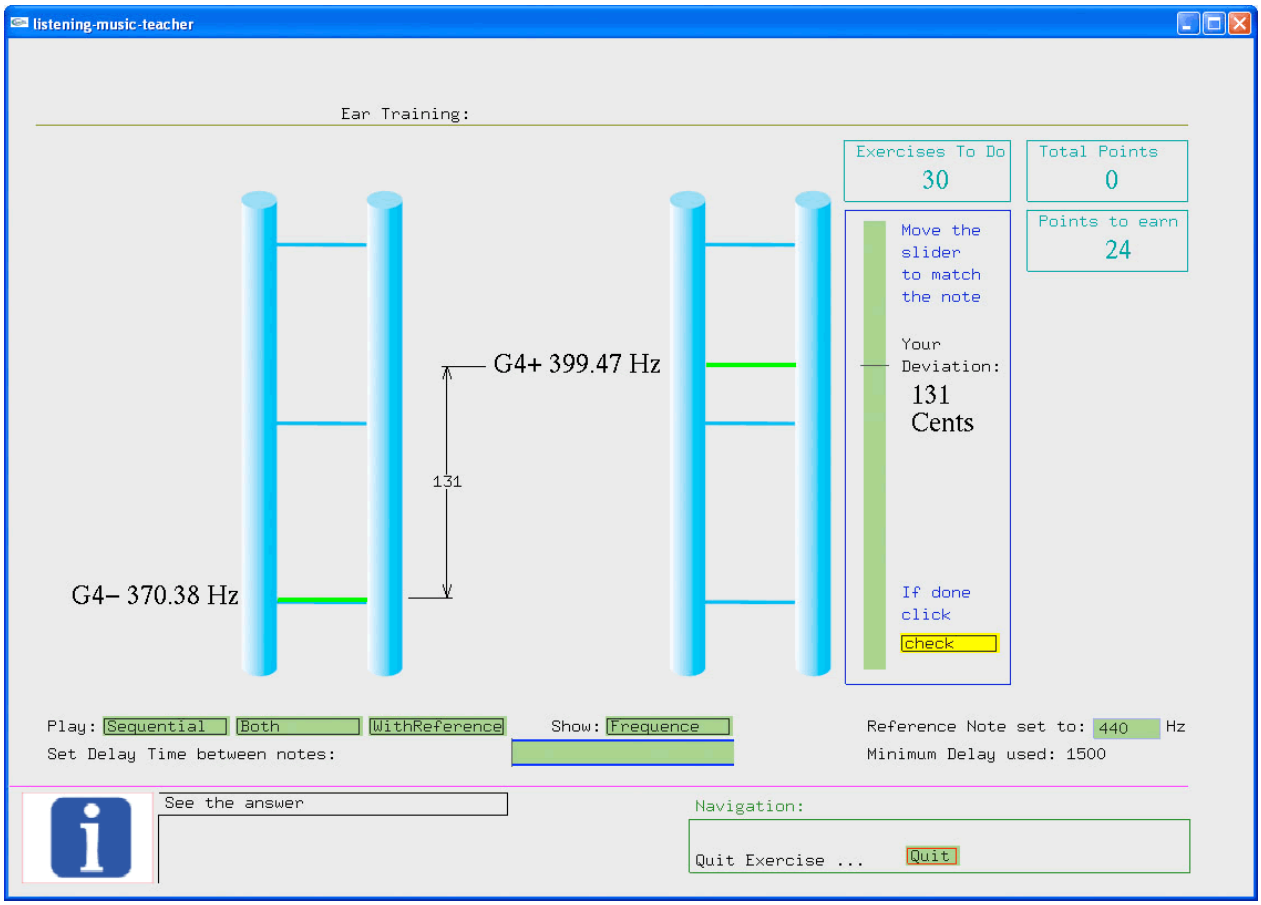
In this exercise you have to translate a chord name into staff writing.



Reading notes from the staff is such a basic skill, that you should also train it from time to time. Maybe not so funny, but it is an important way of our culture to convey and preserve music.

Match the pitch

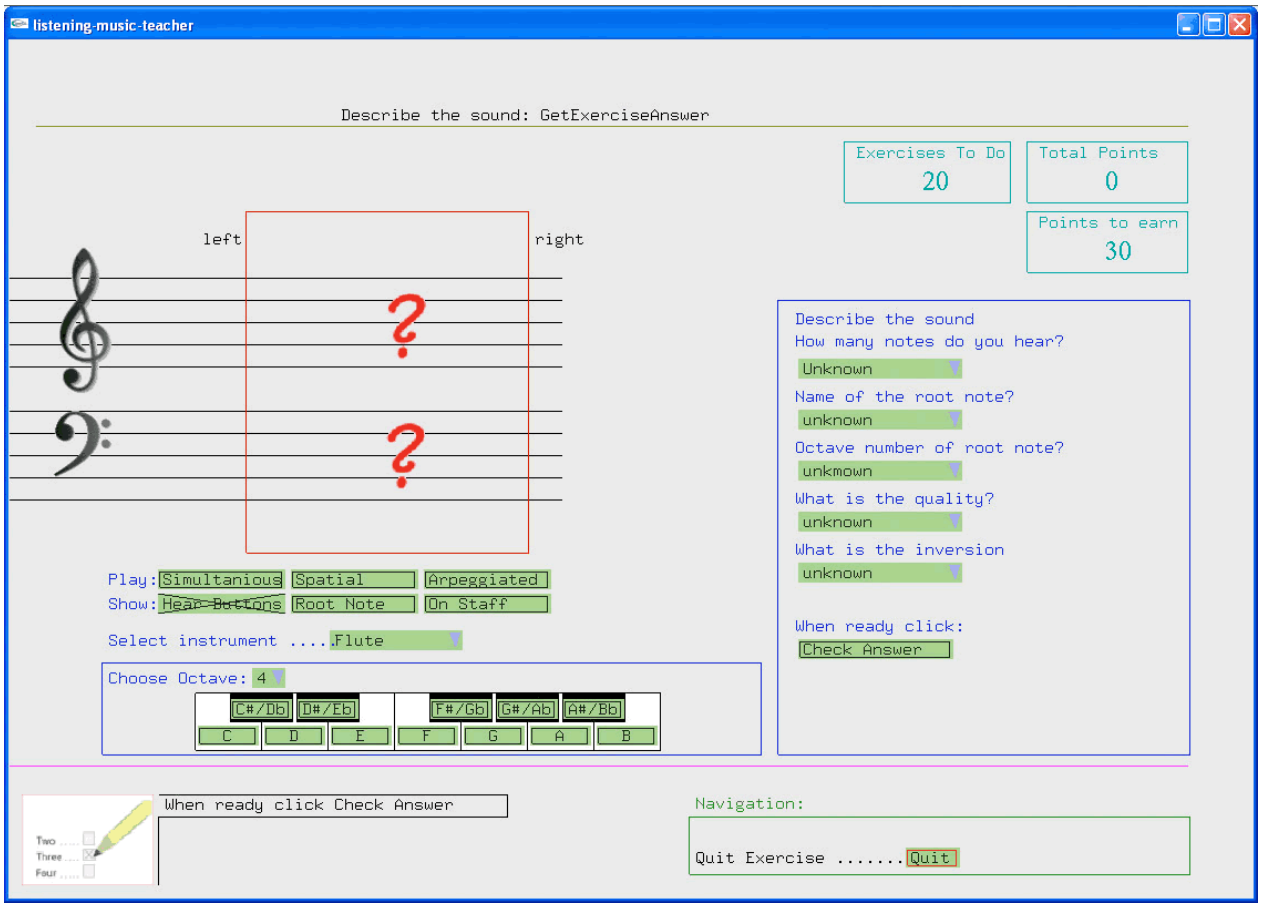
This is the last ear training session. It allows you to test your ear up to 1 cent. As if this would not be difficult enough, you will be disturbed by hearing another sound: The sound where you drag the slider. This means you have to keep the original sound in your mind without letting you deviate from your goal: to match the sound exactly.
(Answer screen shown)



In this screenshot the original sound was a very flat G4 (370 Hz). The slider was dragged in the opposite direction (sharp) and left with 399 Hz for the check. Of course, no points were earned.

Describe the sound

This final lesson sums up your skills, you should now be able to hear a sound, and describe the sound. That is: Ho many notes make up the sound? What is the root note? In which octave is the root note? What is the quality of the sound (intervals, triads and seventh chord only)? And finally, what is the inversion of the sound (triads and seventh chord only)?



In case of a single note, to identify the root note requires absolute pitch. However, triads and seventh chord give you more hints (three or four anchor points) in the sound, so that you probably can guess the root note without perfect pitch.

By clicking “show “Hear Buttons” a piano with one octave range is shown. This allows you to compare the sound with single notes played on the piano.

Statistics

The program collects statistics data to help you identify weaknesses. It does this for the interval exercise and for triad exercises. In the “Select Lesson” screen press the “Statistics” button.

The statistics consists of several pages:

- Interval statistics Unison - Octave
- For each possible root note (12 possibilities) a triad statistics (quality and inversion)

The interval statistics page looks like the above screenshot. There are eleven columns:

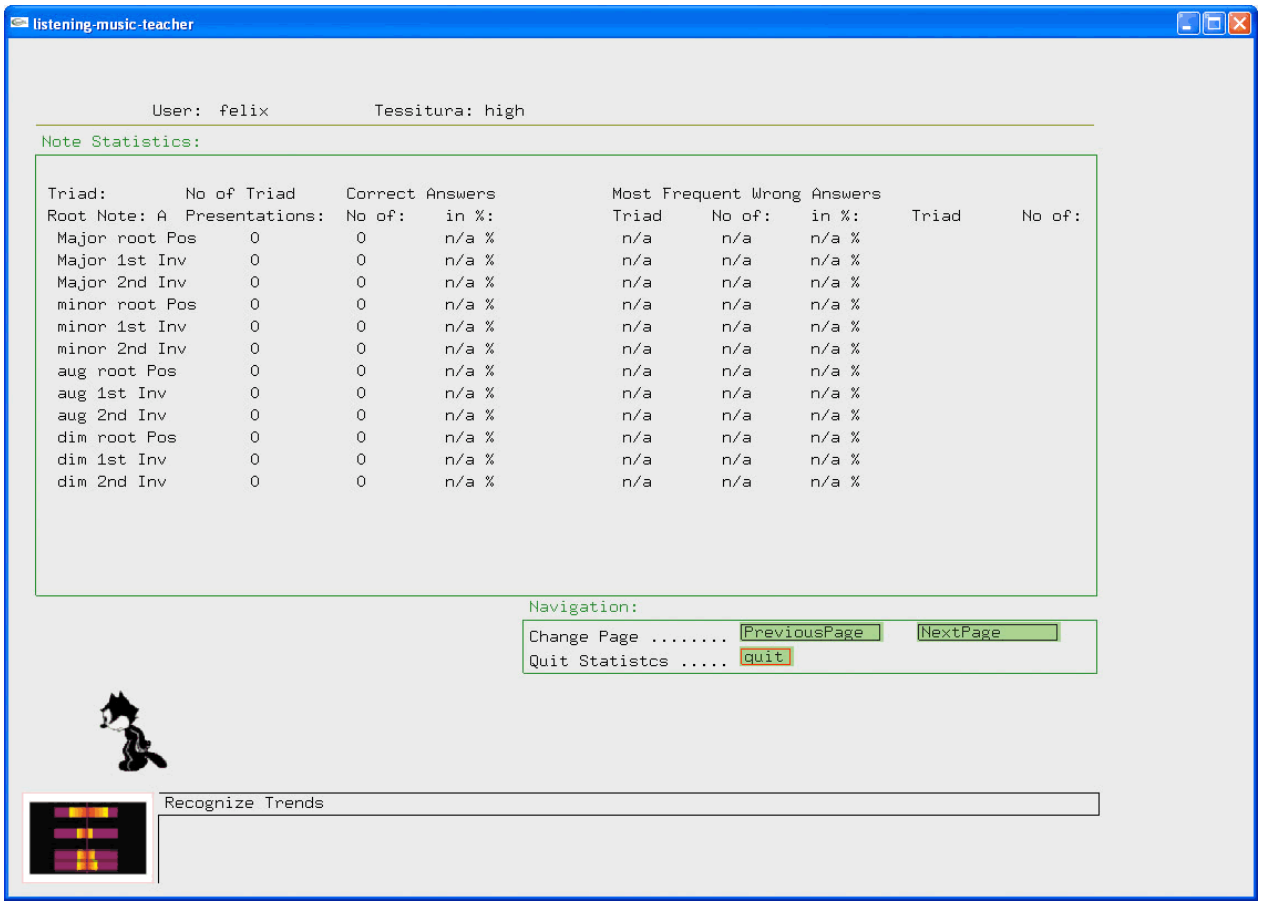
- Interval
  Displays the interval name for which the statistical data were taken.
- Number of Interval Presentations
  Tells you how many times the interval was presented to you in an interval exercise.
- Correct Answers No of
  Displays the number of correct answers.
- Correct Answers in %
  Displays the percentage of correct answers.
- Graphical representation on percentage.
  The green part represents the correct answers. The wrong answers are displayed in dark purple.

- Most frequent wrong answers Interval
  This displays the interval name you clicked most often instead of the correct answer.
- Most frequent wrong answers No of
  This is, how many times you clicked this wrong interval.
- Most frequent wrong answers in %
  Shows the same number in percents of the number of total presentation for this interval.
- Graphical representation of this percentage
  The yellow part represents percentage for these particular incorrect answers. The rest of the rectangle (that is all other answers including correct answers) is displayed as dark purple.
- Second most frequent wrong answers Interval
- This displays the interval name you clicked second most often instead of the correct answer.
- Second most frequent wrong answers No of
  This is, how many times you clicked the second most interval name instead of the correct interval name.

The statistics should give you a hint on what intervals you should also carefully consider as a candidate before clicking an answer. In the above example, if you think this is a tritone, you should listen again and see if it could be a unison or a Major third.

In the above example the Major second was displayed 5 times, 2 times answered correctly, 1 time mistaken for a Major 6, and 1 time mistaken for a Major third. Since the interval was displayed 5 times, there must be a third wrong interval name, which is not displayed. There is only space to display two incorrect answers. However, since the most and second most wrong answer is displayed, you can concentrate on your most common confusion.

Clicking on the “Next page” button brings you to the triad statistics.

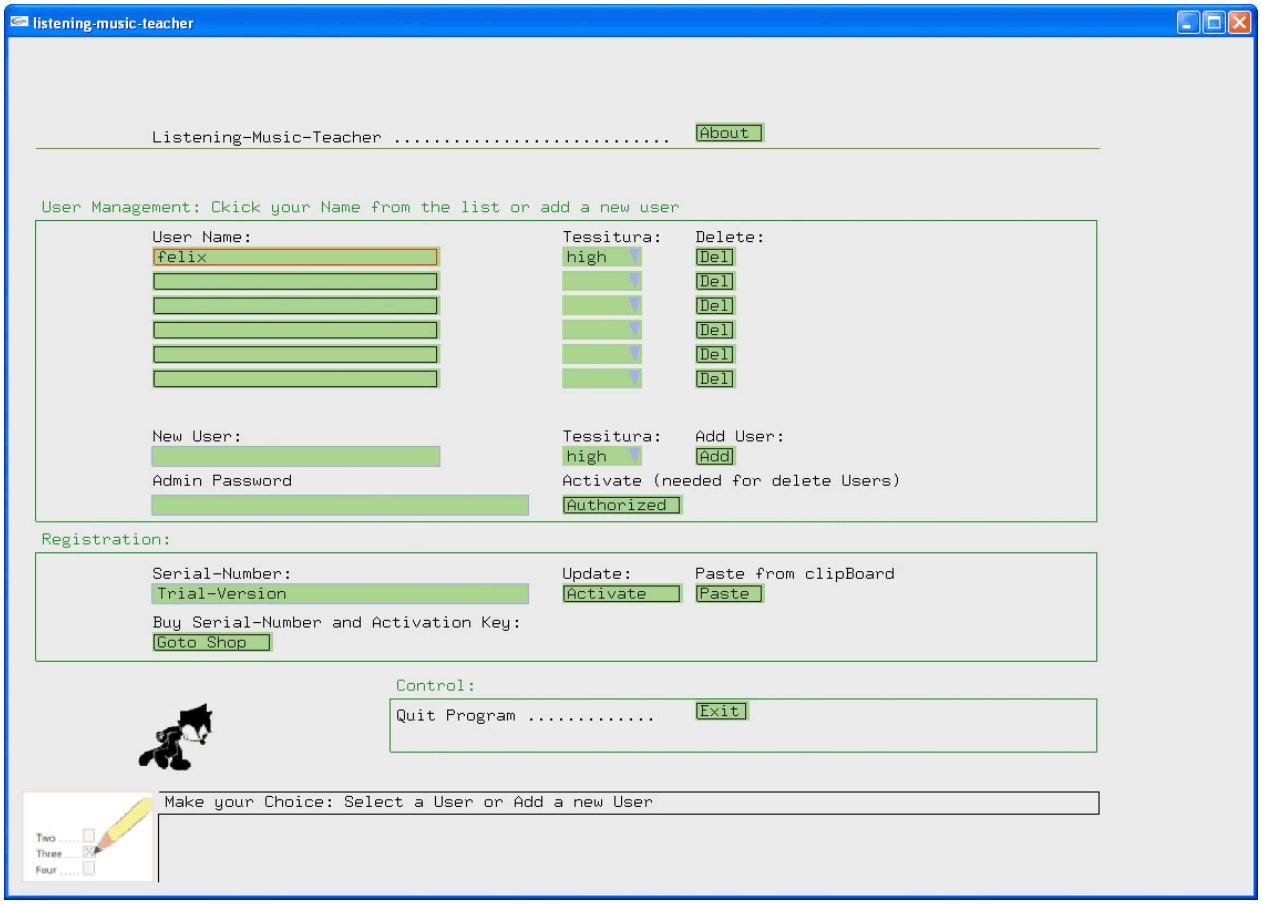


Notice that there are 12 pages for the triad statistics: For each possible root note there is a separate page. The stats start from the note A and go up in half-steps to the note G#.

The columns are labeled the same as for intervals.

Registration

The registration filed is in the “User Select” dialog in the frame Registration.



The fields in the registration frame have the following meanings:

- Serial Number:
  Here you can enter a serial number manually. Normally you do not have to enter a number here, since during the ordering process the serial number will be entered automatically. In the case of a reinstallation you must enter the serial number again. We recommend that you paste the serial number from the order-confirmation mail with the button labeled “Paste”.
- Update:
  This button reads either “Activate” or “Deactivate”. When the product is not registered you have to go through an activation process, by entering the serial number and then press “Activate”. The activation process needs an active Internet connection. If the Button reads “Deactivate” the product is registered. Deactivation may allow you to transfer the program to another computer. However, there is no warranty implied that this process may function (see license terms).

- Paste from ClipBoard:

This button allows you to paste the serial number from the clipboard. You must first mark and copy the serial number in the mail, then come back here to paste the serial number. You still have to activate the serial number by pressing “Activate” (see before).

- Go to Shop:
  If you use the product more than 10 hours you must buy the product or delete it. To further use the product click on “Go to Shop” and follow the instructions.

Modify Exercises

The randomizing of the exercises is controlled by the Exerciseparts.txt file (e. g. generate only notes within a scale or use a chromatic approach, present only triads or only seventh chords or both). In the Listening Singing Teacher manual there is a description of the files involved for modifying the exercises. However, this description is not applicable for listening music teacher. The uses of the fields are different and not implemented in all exercises.

Therefore, - for now -, we recommend not to change the files, since wrong combinations can lead the program to stop.

Tips on How to Learn with Listening Music Teacher

Microphone settings

For Pitch exercises set the input level as high as needed, so you can sing comfortably without stressing your voice.

Environment

If possible take the computer to a room, which is quiet. Use a low noise computer.
Have as little as necessary electrical fields in the room, e.g. turn your handy and other equipments off. Long cables along the microphone cable can induce hearable disturbance.
Finally, the room should have good, fresh and tempered air.

Recognize often confused intervals and triads

Use the statistics to see if you have tendencies to choose a particular similar sounding interval or triad instead of the correct one.

Variety and confidence

Make the exercises in different a pitch, that is choose a different tessitura. The notes will be played and displayed on different positions on the staff.

Absolute Ear (or perfect pitch)

The exercises can help you to acquire a sense for our music system. Since the tonal music follows some rules, it is easier to predict what sounds will come as the next sounds. Also triads and seventh chords contain more than one note, therefore it is easier to identify a chords name, since you have more anchor points (notes) to deduct the chords name. To identify a chord quality is always a relative pitch thing. The chord quality is solely defined by the distances of the notes. That is a Major triad in its root position goes always up four half-steps and then three half-steps from its root note. That is the quality is independent of the root note.

Getting better with the recognition of relative pitch helps also getting better at perfect pitch. However, if you are interested in perfect pitch, the program Listening Singing Teacher is better suited to improve these skills. It addresses single notes and singing is a key factor to the absolute ear. By singing you have to produce a sound with the parts of your body. Therefore you can feel the sound much better than by merely pressing a key on a piano. Nothing is nearer to your perception than your own body parts. Of course your body is dependent on many factors (mood, awakens, etc.), so it is good idea to check with an external reference from time to time. A positive feedback will also increase the trust in your own predictions.

Taking a real teacher

If you like music and want to express yourself with an instrument, it is recommended that you take a teacher. Each instrument has its own features and you should learn to have the proper posture to hold the instrument. Especially in the beginning it is very important to be supervised with simple things like sitting comfortably, have good sight to the scores, and be relaxed. If you start these things wrong, it might be a big hindrance to make progress later when the pieces get more difficult.

Practice times

As with learning another language, it is recommended that you make more short sessions than one long session. We also suggest taking a break every 15 minutes or so.
It is also enriching your experience if you try a lesson in the morning, then around mid-day and finally in the evening. You may find that your perceived recognition is different at different day times.

FAQ

What do I get for the payment?

Payment permits continued use and access to all lessons on the computer the software was installed. There is no warranty on the software. We will try to fix any errors: If you discover a software fault, please notify us. However, the tracking down of errors on other machines than ours is very complicated, therefore please use the software in the trial mode first.

In short, by paying you are allowed to use the program as it is, as long as the program works (e. g. operating system changes may make the program unusable: there is no warranty that we can make a fix in this case).

What happens if I do not register after 10 hours?

Nothing. You break the rules. Please be fair. Many people will try this program for free, and they are allowed to do so: for ten hours. If you still use the program after ten hours, it seems that the software is useful to you: therefore paying is only fair.

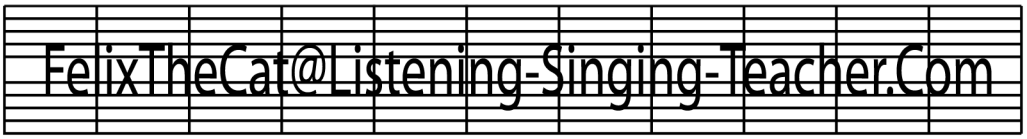
Where do I get support

There is no telephone support hotline. However we are interested in improving the product.
If you find errors or experience program crashes, let us know. Tell us also about documentation errors, sound errors or any other improvement possibilities of the program.
If the program stops unexpectedly, see in the system console log for error messages.
If the problem can be documented by a recording, export the recording and send the recording along with an error description.

Check if you can download a newer version with the same major version number. If so, back up your old version, before installing the newer version and try to reproduce the error.

If no pitch curve is displayed, check the sound control panel if the default input device is working correctly. If the input level is too low, increase it with the slider. If this does not work, you may have a microphone, which is not suited for that input channel. Expensive microphones often need special pre-amplifiers! The input channel must support microphones; line-in input channels expect a higher voltage signal than what you will get from microphones. There may also be a separate control panel for your digitizing device to adjust the sensitivity, check your hardware manuals. If you hear a lot of background noise, make sure nothing else is disturbing you. If there are clicks, chirps or hissing hearable, you might have unshielded microphone cables, which pick up electro-smog, or the microphone itself picks up a grumble from the 50/60 Hz power outlets. Try to reposition the microphone/cables. Make sure that the loudness display is in a correct range. If you make no sound, the sound control panel should show zero input level indicator lights.

Send all the information (e. g. Computer Model, RAM, graphic card, audio equipment, etc.) you think might be helpful in resolving the problem to:



Can I print the statistics?

Unfortunately, this version does not contain a print feature; you must make hardcopies of the windows (Mac use the application grab from the utilities folder).

Why this fancy licensing terms, like the use of software is all at your sole risk?

In today's modern world, where everybody can sue everybody for everything, one has to be cautious. Assume you are a super soprano, and you can break glassware just by singing. Please do not blame Listening Singing Teacher for such achievements; we are not willing to pay for that. Even worse, if you are a bass singer, which could destroy Jericho (hopefully you do not live in New York) … You get the idea!

Software is very complex, and computers are configured in different ways (and maybe have some problems on there own, it may even be important in which order you installed software), we cannot predict the behavior of the program. Therefore the risks to download, install or run the software is all at your risk. If you are very insecure and think if you stay at home all the time then you are safe, okay. If you fear that this software can destroy your computer or data on your computer: do not download, install or run this software. We really cannot guarantee that the server from where you download the software has not been hacked or that during the transmission no manipulations were made.

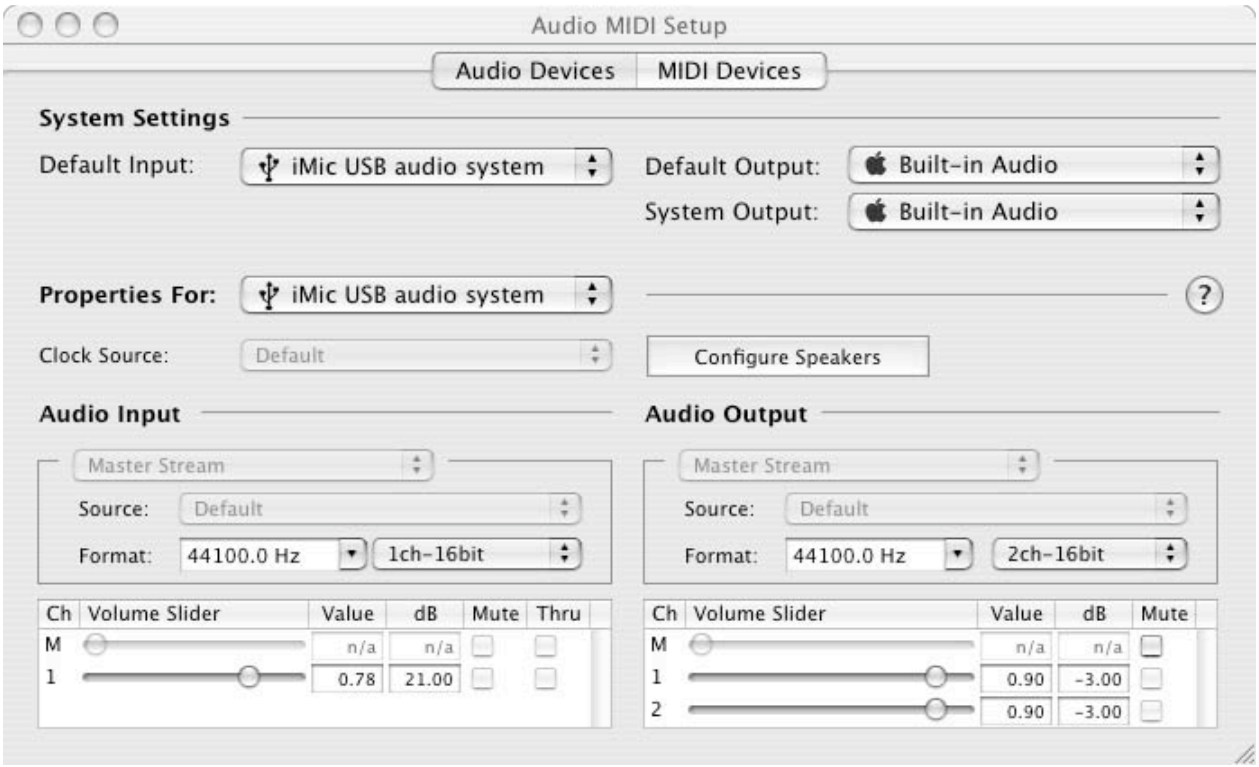
Do I have to be online to use the software?

No. You only have to be online for the download and the activation of the serial number.

Microphone Input level too low, distortion or audio device not supported (Macintosh)

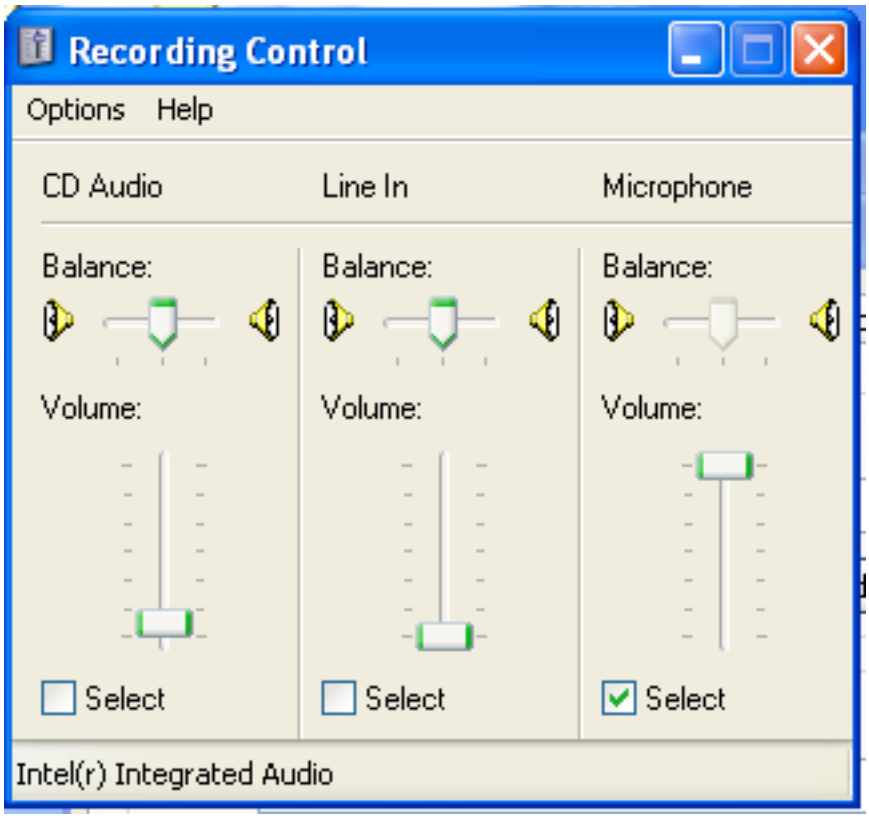
In the applications Utility Folder open "Audio Midi Setup", and Select the "Audio Devices" Tab. From the "Default Input" Drop down Menu choose your microphone and in the "Properties For" also choose your microphone (see below). Drag the slider on the bottom of "Audio Input" to the right. Also make sure that the selected format is 44100.0 HZ and one channel 16 bit (1ch-16bit).

Other audio applications (e. g. GarageBand) may reset the input level, the frequency or the 16bit setting to 8bit. Be sure to check and set the following settings correctly:



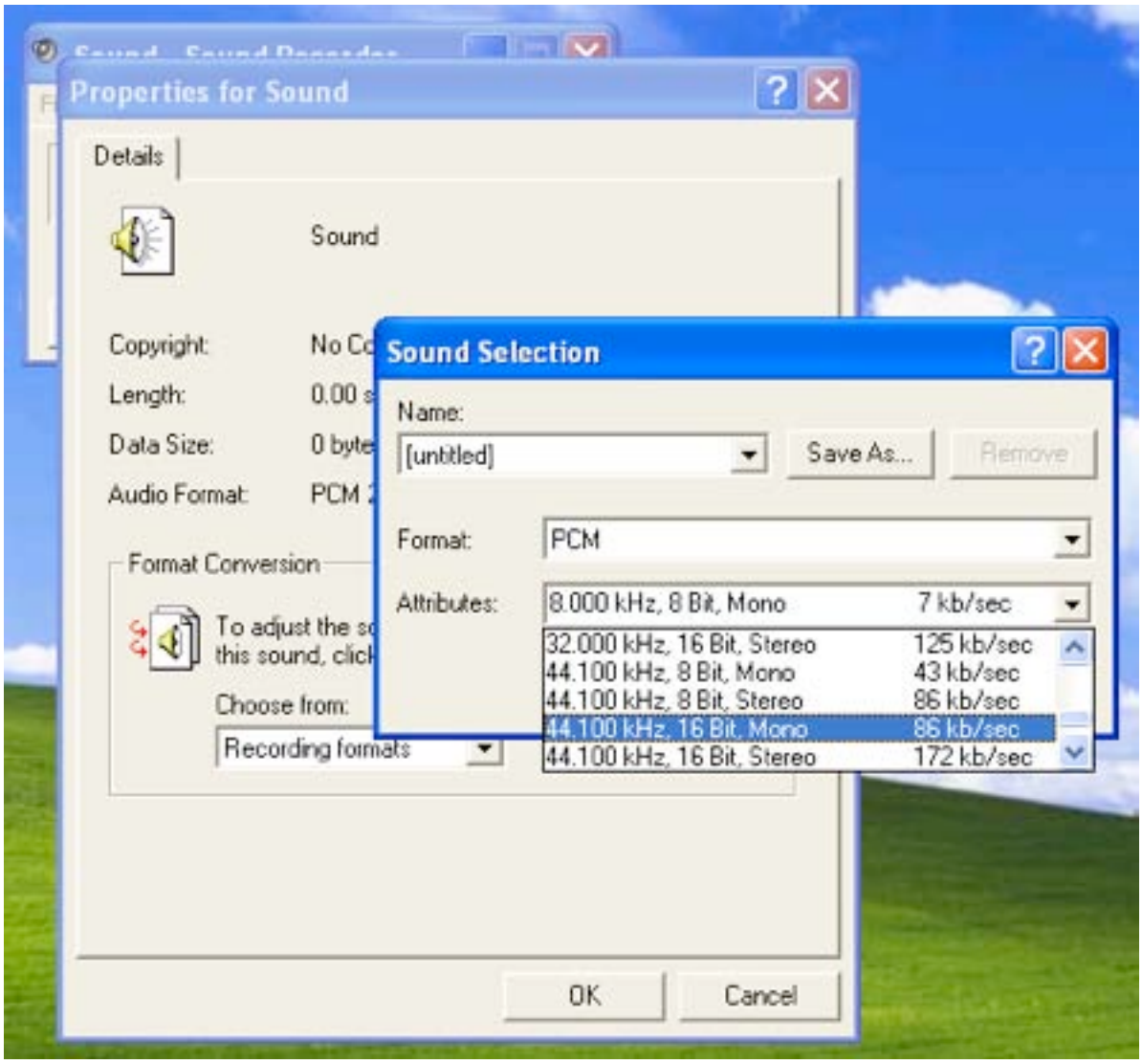
Microphone Input level too low, distortion or audio device not supported (Windows)

In the control panel choose “Sounds and Audio Devices”. Click on the Audio tab. Under Sound recording set the volume for the microphone to the maximum.



Also make sure that the Format is set to 44.100 kHz and 16 Bit Mono. Make a Test Recording with the “Sound Recorder” (Click On “Start” --> “All Programs” --> “Accessories” --> “Entertainment” --> “Sound Recorder”).

In the Sound Recorder under the “File” menu click on “Properties”. Under Choose from select “Recording formats” and click “Convert Now”. Set the Format to PCM and select “44.100 kHz 16 Bit, Mono”.


Properties for Sound
Details
Sound
Copyright:
Length:
Data Size:
Audio Format:
Format Conversion
Choose from:
Recording formats
OK
Cancel
Sound Selection
Name:
[untitled]
Save As...
Remove
Format:
PCM
Attributes:
8.000 kHz, 8 Bit, Mono 7 kb/sec
32.000 kHz, 16 Bit, Stereo 125 kb/sec
44.100 kHz, 8 Bit, Mono 43 kb/sec
44.100 kHz, 8 Bit, Stereo 86 kb/sec
44.100 kHz, 16 Bit, Mono 86 kb/sec
44.100 kHz, 16 Bit, Stereo 172 kb/sec

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During the Installation you will be asked to accept the licence terms of Openal.

3. Glut32.dll (Windows only)

Glut32.dll is under LGPL (GNU Lesser General Public License):

```
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